

*The following paper, reprinted in full here, was presented in **Subtle Energies 2,3** (1991), pp. 69-94. It is one fulcrum of Dr. Green's recent work around which much of his scientific conceptualization pivots. It exemplifies the emphasis on physics—as opposed to chemistry—in energy medicine. It uses conventional physical science and measurement as correlates of, and a springboard to, developing hypotheses concerning the domain of those (as yet) “unmeasurables” of energy medicine. [Eds.]*

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ANOMALOUS ELECTROSTATIC PHENOMENA IN EXCEPTIONAL SUBJECTS

Elmer E. Green, Ph.D., Peter A. Parks, M.S., Paul M. Guyer, B.A.,
Steven L. Fahrion, Ph.D., & Lolafaye Coyne, Ph.D.

ABSTRACT

A Tibetan meditation system reported in 1882 suggested a way to facilitate self-awareness by isolating students from electrical ground while they sat beneath a bar magnet and looked at their image in a polished copper wall. The research question: Does an electrostatic charge build up on electrically-isolated meditators?

This question was tested with 10 “regular” subjects (typical meditators) and 9 “exceptional” subjects (experienced Non-Contact Therapeutic Touch (NCTT) therapists) in a Copper Wall Lab designed to isolate the subject from ground and also isolate, individually, four surrounding copper walls, front, back, up, and down. For detection of electrostatic potential, the subject's body and the four walls were individually “floated” on single-ended electrometer inputs. A pair of video cameras guarded against body-motion artifact.

In 45-minute meditation sessions with the 10 regular meditators, *no body-potential surges reached 4 v*. In comparison, in comparable meditation sessions with the NCTT meditators, many body-potential surges greater than 4 v were found. Surges appearing in the records of NCTT meditators ranged from 4 v to 221 v (median = 8.3 v), with surge duration ranging from 0.5 s to 12.5 s (median = 3.6 s).

During NCTT *therapy sessions* with patients, NCTT therapists produced body-potential surges ranging from 4 v to 190 v. The majority of surges were of negative polarity. Though there is a long tradition of Non-Contact Therapeutic Touch in both folklore and in religion, there are as yet no known psychophysiologic or biophysical explanations for such large-magnitude electrical phenomena, 10^3 times greater than large psychophysiologic skin-potential (GSP) changes related to emotional responses, 10^5 larger than EKG voltages, and 10^6 larger than EEG voltages. Since focus-of-attention by NCTT therapists is often a correlate factor in this anomalous phenomenon, results suggest the presence of previously-unmeasured *human* potential, as well as body potential.

Various schemes are discussed for analysis of body-potential surge data, with an eye to determining body mechanisms that might be capable of generating electrostatic charge.

INTRODUCTION

The meditation literature of the last century includes a curious reference to electrical isolation of student monks from ground while they sit in front of a copper wall and beneath a bar magnet. Specifically, a letter from a meditation teacher to A. P. Sinnett, editor of *The Pioneer*, the best known English-language newspaper of India in 1882, said:

The methods used for developing lucidity in our chelas [student monks in Tibet] may be easily used by you. Every temple has a dark room, the north wall of which is entirely covered with a sheet of mixed metal, chiefly copper, very highly polished, with a surface capable of reflecting in it things, as well as a mirror. The chela sits on an insulated stool, a three-legged bench placed in a flat-bottomed vessel of thick glass. . . . A magnet with the North Pole up is suspended over the crown of the chela's head without touching it. [The chela is left] alone gazing on the wall. . . .¹

A search through several hundred journal articles, abstracts, and titles on meditation, biomagnetic and bioelectrical phenomena, biology and psychophysiology, found no previous study relating to the above magnetostatic and electrostatic procedure, or to any comparable procedure.² The Tibetan meditation procedure described above stimulated several research questions. Namely:

1. Is the body isolated from ground in order to conserve an electrostatic charge that builds up during meditation?
2. If so, can a technology be developed (instrumentation, procedures, data handling, etc.) for detecting body-potential (P_b) phenomena in and around the bodies of experimental subjects?

Note: At present, in the absence of knowledge of mechanisms, P_b is thought of as an electrical-engineering measure, an absolute voltage relative to ground. In other words, at present P_b is not thought of as an electrophysiologic or psychophysiology measure, any more than the voltage appearing on an insulated human body charged by a Van de Graaff electrostatic generator would be considered electrophysiologic or psychophysiology in origin. In particular, P_b should not be confused with "skin potential," galvanic skin response (GSR, sometimes labeled SP).³

3. What does the North Up magnet do?
4. What would happen with the magnet oriented South Up?
5. With the magnet Absent would meditation experience be different from both North Up and South Up?
6. Would a range of magnet strengths have a corresponding range of experiential effects?
7. What do students see when gazing at their reflection in the wall?
8. Under the prescribed conditions, what are the characteristics of meditative “lucidity” in Westerners?

*The present report focuses only on Questions 1 and 2 above. Regarding Questions 3-5, however, responses by subjects to an experiential questionnaire, after double-blind exposure to magnetic fields oriented either North up, South Up, or Absent (with the magnet replaced by a lead-foil weight), indicated that (a) humans are significantly affected in the *physical* domain by magnetostatic fields, and (b) experiences of the two sexes are significantly different.⁴ Regarding Question 6, preliminary analysis indicates that a field of 140 *gauss* at the crown of the head has stronger physical effects than a field of 14 *gauss*. A report on Questions 7 and 8, especially concerning the nature of meditative “lucidity” in Westerners under the above conditions, awaits *content analysis* of experiential questionnaires and verbal reports.*

Between 1983 and 1991 we conducted four experiments in which experienced meditators, isolated from electrical ground, participated in meditation sessions beneath a bar magnet while gazing at their image in a polished copper wall.⁵ Experiment 1 was conducted in a *single-wall* lab with a single electrometer attached to the wall.⁶ Experiments 2, 3, and 4 were conducted in a *four-wall* lab with four wall electrometers, and a fifth electrometer attached to the subject’s body.⁷ In Experiment 3, in addition to a study of meditation effects, the electrical effects of Non-Contact Therapeutic Touch were studied. These electrical effects are the primary focus of the present report.

To provide context for the reader, all four experiments are discussed below. The primary focus of attention of the present report, however, as mentioned

above, is on Experiment 3, in which 14 exceptional subjects, classed as “sensitives” in parapsychological research (including a group of 9 Non-Contact Therapeutic Touch therapists), were studied. Experiments 1, 2, and 4 were conducted with “regular” subjects, meditators who would not normally be thought of as parapsychological “sensitives.”

EXPERIMENT 1

Using an electrically-isolated chair, 19 experienced meditators (10 women and 9 men who had two years or more of meditation practice) participated in 30 weekly 45-minute meditation sessions in front of an insulated copper wall that was “wired” to an electrometer. All subjects were college graduates and most of them were Menninger staff members. In the last 15 sessions, subjects meditated double-blind in randomized magnetic conditions. An overhead bar magnet either North Up, South Up, or Absent, provided a field density of 14 gauss (± 0.28 gauss) or 0.28 gauss, earth field, at the crown of the head. An experiential questionnaire was answered after each session.

Results:

1. Analysis of questionnaires suggested (a) that humans are significantly affected in the physical domain by magnetostatic fields, and (b) experiences of the two sexes are significantly different.⁴
2. *Electrical results* were problematic. The “single wall” consisted of plywood-backed copper sheeting mounted on a wooden frame, on the reverse side of which, for electrical reference, aluminum sheeting was attached. This assembly, like the subject, was insulated by glass blocks from the floor and from the wall against which it rested. Electrical signals from the copper wall and the aluminum backing were led to the inputs of a *differential* electrometer. This differential arrangement made it possible to detect remarkably small body-motion (capacitive) electric field effects, such as respiration and cardioballistically-superimposed heart beat, but no changes in wall potentials were found that could, without question, be ascribed to meditation-related P_b changes. In large part, this was because slight body movements (less than 3.0 cm) caused the differential electrometer to saturate.

Experiment 1 did not answer electrical questions, but it generated several.

1. If body-motion artifacts could be accounted for, would four independent *single-ended* electrometers attached to four independent electrically-floating copper walls placed around the subject, with matching aluminum reference walls grounded, reflect synchronized changes in response to changes in P_b ?
2. What P_b phenomena would be found with a single-ended electrometer attached to the electrically-isolated *subject*, that is, with only *one wire* attaching the subject to the environment? Specifically, in the present case, one wire going from an ear-lobe electrode to a single-ended electrometer whose own electrical reference is earth ground. Thus, the body and its associated physiologic telemetering system float free in electrical space with electrometer ground as reference for P_b .
3. If significant P_b phenomena were obtained under these conditions, would they correlate with coincident psychophysiologic data?

CONSTRUCTION OF FOUR-WALL LAB

Goals: As part of an effort to answer the above questions, in 1986-1988 the copper lab was redesigned and converted into the four-wall system diagrammed in Figure 3.3.⁷ The restructuring of the copper room had four main purposes, To make it possible:

1. to measure voltage levels of the subject's body relative to earth ground,
2. to measure, relative to earth ground, voltage levels of copper walls located in four directions from the subject's body, front, back, up, down,
3. to monitor and *telemeter* psychophysiologic variables, and
4. to monitor simultaneously by video camera (a) the subject, and (b) associated psychophysiologic and electrometer strip charts.

Walls and Electrometers: Each of the four walls, comprised of three side-by-side panels, measures 2.73 m wide x 2.13 m, but only the center copper panel (91 cm x 2.13 m) of each wall is wired to an electrometer. The adjacent side panels of each wall are individually isolated and float free. Four single-ended

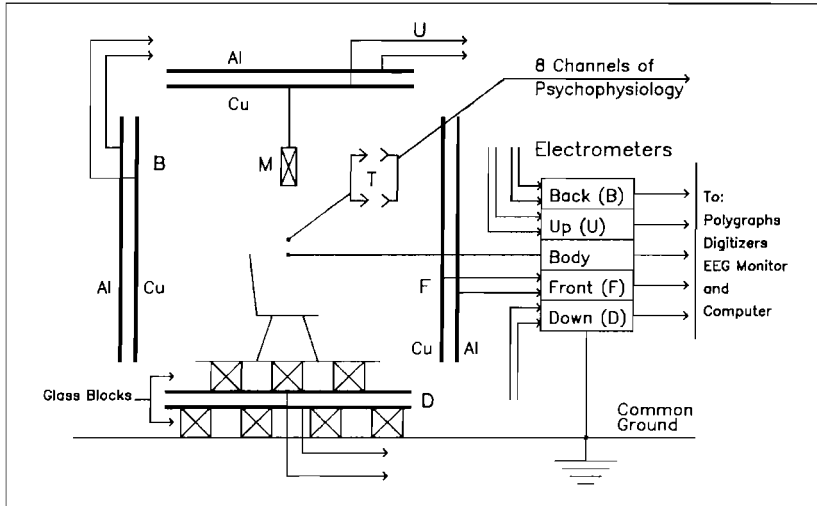


Figure 3.3. Schematic diagram of copper-wall meditation room. Four pairs of insulated copper (Cu) and aluminum (Al) panels float in electrical space around a research chair which also floats electrically, insulated from the down wall (D) by glass construction blocks. A bar magnet (M) is suspended over the subject's head during meditation and 8 battery-powered channels of psychophysiology data lead to the control room via optical telemetering (T). Signals from the four Cu panels, front (F), back (B), up (U), down (D), and from the subject's body, are fed into single-ended electrometers. Al panels reach common ground through their electrometers. Data from all channels are forwarded to polygraphs, digitizers, and a computer. Two video cameras that watch subjects during sessions (one on each side) are not shown.

Keithley 614 Electrometers (input impedance 5×10^{13} ohms) measure copper wall voltages. A fifth single-ended Keithley 617 Electrometer (input impedance 2×10^{14} ohms) monitors P_b from the subject's left ear-lobe electrode. Charge-decay time constants of the four walls and a wired-up body were, in minutes and seconds: front, 5:54; back, 5:50; up, 5:37; down, 3:20; and body, 0:44.⁸ A Keithley 500 Data Acquisition System samples electrometer signals at 32/sec. and physiologic signals at appropriate rates (from 1/s to 128/s). Output of the Keithley 500 is transferred through digital buffers to IBM PC hard disk.

Environmental Conditions: During experiments, ambient temperature is maintained at 22°C (71.6°F) $\pm 0.5^\circ\text{C}$, relative humidity is maintained at $42\% \pm 2\%$, and negative ion concentration in the air-conditioning system remains

within a range of 50 to 250 ions/cc (fluctuating in no apparent order, second by second). Ion density is continuously monitored by a self-contained battery-powered Biotech BT 400 Electroscope, mounted near one edge of the back wall, and recorded on a polygraph channel.

Psychophysiologic Monitoring and Telemetry: A self-contained battery-powered optical-link telemetering system relays physiologic data from the subject to the control room.⁹ These data are not germane to the present report, but the capacitance of the wiring and associated gear adds to the subject's body capacitance, and together they determine, along with resistance of the body to ground, the charge-decay time constant of the body.

Video Monitoring: A four-camera video system gives a continuous 30-frames-per-second record of the subject and associated polygraph strip charts. Two cameras, one on each side of the front copper wall, monitor the subject for *body-motion* artifact control. In the control room, two video cameras mounted in the ceiling above two 8-channel step-front polygraphs (Beckman and Sensor Medics), obtain coincident records of psychophysiologic and electrometer strip-chart data. Videocam clocks and time markers on strip charts provide synchronization with Keithley-500 digital data. The four video cameras feed into a Video Quadsplitter (Panasonic WJ-450), and its four-screen output is displayed on a video monitor and recorded by VHS VCR.

Control Data:

1. In 15 45-minute sessions *without* a subject in the copper-wall room, the most drift-prone wall (the down wall) reached stable voltage levels after about half an hour. At the 30-minute point the maximum *positive* voltage reached in 11 positive-going sessions was 0.4 v, and the maximum *negative* voltage reached in 4 negative-going sessions was -2.5 v.
2. In 3 45-minute sessions, 3 different non-meditating regular subjects (2 women, 1 man), wearing synthetic clothing, made body-movement control trials. When instructed to move "the top of the head in a circular roll," about 25 cm in diameter, the maximum shift in P_b was 0.5 v, and the most responsive *wall* (back) showed a maximum shift of 0.5 v. When instructed to move "the right hand about 50 cm, from the chair's right arm rest across the body to the left," the maximum shift in P_b was 0.15 v, and the most responsive *wall* (up) showed a maximum

shift of 1.4 v. *From here on in this paper, body-potential surges with body motions less than 30 cm are referred to simply as Pb surges.*

EXPERIMENT 2

In 1988, using the 4-wall system, 10 of the original 19 subjects (5 women and 5 men), participated in 15 additional double-blind meditation sessions, similar to those of Experiment 1, except that the overhead magnet produced a field of 140 *gauss* at the crown of the head rather than 14 *gauss*, and, in addition, subjects were wired for physiologic and P_b monitoring.

Purposes:

1. To use a stronger magnet than in Experiment 1 in order to get experiential data on a magnetostatic Continuous Adaptation Function, possibly similar to that found in psychophysical functions of the “regular” senses.¹⁰
2. To get pilot data on P_b phenomena and psychophysiologic correlates in the four-wall milieu.

Results:

1. *Experiential* findings significantly paralleled those of Experiment 1.⁴
2. In the *electrical* domain, P_b and wall-voltage records obtained during 1 session of 1 subject tended to support the hypothesis that meditation in the copper-wall milieu produces electrical charge on the body. But, results were inconclusive because on several occasions the video system was inoperable and we did not have certainty of non-body-motion artifact-free data.

Artifact-free data were obtained, however, in Experiment 3 with 14 “exceptional subjects,” and also in Experiment 4 with 10 additional regular subjects.

EXPERIMENT 3

Purposes:

1. To recruit and test a group of subjects classed as “sensitives” in parapsychological research, under the hypotheses that (a) experientially, they would be unusually

responsive to magnetic fields of different strengths and different orientations, (b) their electrometer records would show P_b and wall-voltage phenomena associated with copper-wall meditation, and (c) they would be more likely than regular subjects to have P_b and wall-voltage phenomena associated with copper-wall meditation.

2. To include in the “sensitive” group a number of subjects who also could be classed as Non-Contact Therapeutic Touch (NCTT) therapists, under the hypothesis that during NCTT sessions with patients an unusually large number of P_b and wall-voltage phenomena would be found in and around therapist’s bodies.

Subjects: In 1988-1990, 14 sensitives (7 women, ages 37 to 65, and 7 men, ages 38 to 70, including a subgroup of 9 NCTT therapists [6 women, ages 40 to 65, and 3 men, ages 38 to 50]) participated individually in 5 days of research trials. Scheduling was not easy, for these unusual subjects had crowded therapy and workshop schedules, but travel and living expenses were reimbursed and they received monetary compensation for their time. Of the 15 candidates interviewed by author EG, 14 accepted and one declined, saying that the magnetic field might interfere with the valued state of sensitivity and/or “energy control.”

The 14 sensitives who participated in copper wall research were veteran subjects of parapsychological research and most were professionally involved in organizing and conducting workshops on the development of human potential. Having a subgroup of 9 NCTT therapists as part of a larger group of sensitives was appropriate according to their self classification. Without exception, NCTT therapists thought of themselves as sensitives. All sensitives, however, are not NCTT therapists. The 9 therapists had diverse backgrounds and trainings, and with one exception did not consider themselves to be traditional Therapeutic Touch practitioners. We hope they accept our apologies for classing them together, but in overt therapeutic behavior (regardless of individual psychological and psychophysiologic processes during therapy) they appeared very similar. We enlarged the original meaning of NCTT, therefore, (as limited to a specific methodology), and used the term generically.

Instrumentation: During meditation (experiential) sessions, equipment included all items of the four-wall lab as described above. During NCTT sessions, however, the overhead magnet was removed from the copper-wall room.

Procedures:

1. The first 2 1/2 days with all subjects consisted of 6 copper-wall experiential sessions in the four-wall lab with differing magnetic conditions (similar to previous experiments with regular subjects).
2. During the subsequent 2 1/2 days, a number of NCTT sessions were run in which NCTT attention was focussed on “patients,” namely, Menninger employees who volunteered to be recipients of NCTT attempts. Patients had typical minor complaints such as tennis elbow, a cold, lower back pain, etc., but whatever the complaint, we did not study patients, nor their complaints, nor their benefits from a NCTT session. Benefit, or lack thereof, was not a research question. The patient’s function was to be a *genuine* target for NCTT attention. NCTT therapists generally were not interested in mechanistically trying to influence either their own body potential or wall voltages.

NCTT sessions were conducted with patients either (a) *in the copper wall room*, sitting in front of the therapist in a chair insulated from the floor by glass blocks, or lying in front of the therapist on a narrow couch suspended on wooden sawhorses across the down copper panel (in sight of the video cameras), or (b) *at a distance*, resting in a recliner chair in another part of the lab, four walls and four rooms away.

To eliminate the possibility of movement artifact playing a role in P_b classification, a super-conservative threshold of 4 volts was chosen for classification of P_b surges. This 4-volt criterion was more than twice the magnitude of any motion-based “surge” seen in the records of regular subjects. This threshold eliminated many classifiable P_b surges from the records of every NCTT therapist, but we chose this classification-of-anomaly criterion to satisfy ourselves, beyond all doubt, that surges were not motion-based.

Results: Though subjects participated in only 6 meditation sessions, experiential findings significantly paralleled those of Experiments 1 and 2.⁴ In the electrical domain, which is the primary focus of the present report, results were as follows.

1. **During meditation:** P_b surges and wall electrometer records supported the hypothesis that during meditation P_b phenomena would appear in the records of sensitives. Specifically: Although each of the exceptional subjects had only six experiential sessions in which we could gather P_b data, many anomalous P_b surges appeared

Table I

Number of anomalous meditation related body potential surges greater than 4 volts seen in the electrometer records of 14 sensitives, each of whom participated in 6 45-minute copper-wall meditation sessions. Subject number is a non-chronological code for the time period of the research, July 1988 to July 1990.

Subject Number	Number of Body Potential Surges	Mean Amplitude (volts)
1	1	7.9
2	0	0.0
3	0	0.0
4	0	0.0
5	0	0.0
6	0	0.0
7	1	5.0
8	0	0.0
9	6	9.3
10	0	0.0
11	51	22.8
12	8	7.2
13	0	0.0
14	1	4.5

during periods of no discernible body movement (less than 1.5 cm in video records). These P_b surges are considered anomalous because neither we nor our consultants (biomedical engineers, physicists, and physicians) can point to any known psychophysiological mechanism by means of which high-amplitude voltage surges lasting a few seconds can be generated in the human body. A large skin-potential (GSP) surge caused by emotional activation may reach 50 mv, but many P_b surges found by electrometer in NCIT therapists were 10^3 times greater. Also, for comparison, P_b surges were 10^5 larger than EKG voltages, and 10^6 larger than EEG voltages.

All these meditation-related surges were found in the records of 6 of the 14 sensitives. Of these 6 subjects, 5 were NCIT therapists. Measured from P_b baseline, the peaks of surges ranged in absolute amplitude from 4 volts to 221 volts (median = 8.3 v). Surge durations measured at baseline ranged from 0.5 s to 12.5 s (median = 3.6 s). Table I shows the number and distribution of P_b surges greater than 4 volts in sensitives during meditation.

2. **During NCTT sessions with patients:** Electrical records obtained during sessions with patients included a large number of P_b and wall-voltage phenomena. Voltage analysis of most NCTT sessions has not yet been completed. Eventually a report will be written with a detailed analysis of all P_b surges found during therapy sessions with all NCTT therapists. At present, analysis has been completed for several sessions with three (of nine) NCTT therapists. Typical examples of session results are given below.

- A. Analysis of the first therapy session (18 minutes) for Therapist 7 revealed 17 body-potential excursions greater than 4 volts. Upon visual examination of the video tape record, 12 of these were classified as P_b surges (that is, surges which appeared in the body-potential electrometer record during “no movement” or tolerable “low movement” of the subject). Surge amplitudes ranged from 4.2 volts to 12.2 volts, with a mean of 7.3 volts.
- B. Analysis of the first therapy session (50 minutes) for Therapist 9 revealed 87 body-potential excursions greater than 4 volts. Upon visual examination of the video tape record, 69 were classified as P_b surges, ranging from 4.1 volts to 122.4 volts with a mean of 14.7 volts.
- C. Analysis of the first therapy session (35 minutes) for Therapist 11 revealed 112 surges greater than 4 volts. Upon visual examination of the video tape record, 86 were classified as P_b surges, ranging from 4.1 volts to 162.1 volts with a mean of 21.0 volts.

The largest P_b surge observed during all NCTT sessions had an amplitude of 190 v from baseline. Most of the P_b surges described above were of the type shown in Figure 2, which is a graph of two P_b surges, with associated wall voltages, from Therapist 11, first therapy session (Session 7 of the research week).

3. **Baseline Levels:** Most P_b baseline levels in the NCTT sessions of Table II are at values considerably larger than baseline values of either regular subjects or sensitives during *experiential* sessions. Table III shows these comparisons.

In general, the large baseline levels of Table II appeared abruptly in the electrometer record after the appearance of the session's first large P_b surge. Interestingly, the sudden appearance, and continuation, of a large baseline voltage implies the sudden appearance, and continuation, of anomalous electrostatic charge on the subject's body.

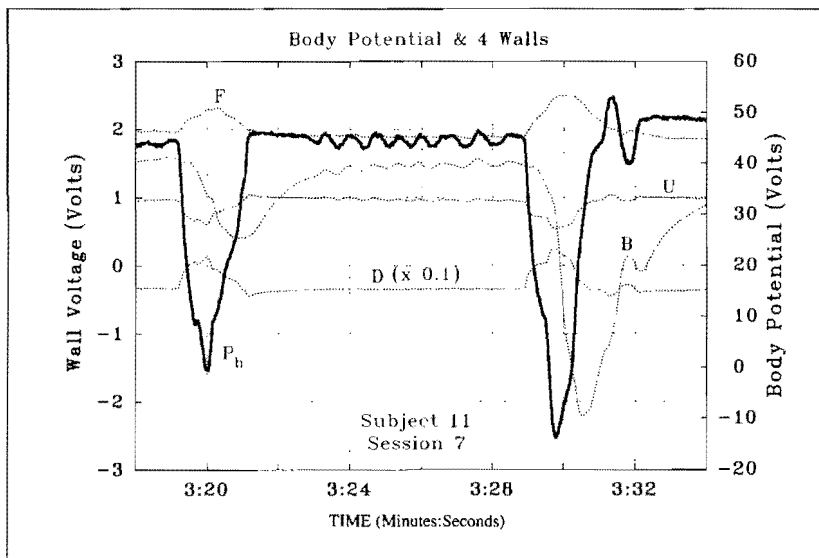


Figure 3.4. Typical graphs of P_b surges and wall-voltage responses observed during a Non-Contact Therapeutic Touch session (from the digital records of Therapist 11, first therapy session). The sine-wave-like ripple between the two surges is the subject's hand-motion artifact. It is noteworthy that the surge responses of the front wall (F) and the back wall (B) went in opposite directions, and their peaks were not coincident in time. Note: Fifteen additional P_b surges during this single session had amplitudes greater than 25 volts.

EXPERIMENT 4

Purposes:

1. To replicate Experiment 2 with a new group of regular meditators, thus obtaining additional double-blind experiential data.
2. To compare P_b and wall-voltage records of meditating regular subjects with similar records from Experiment 3 with meditating sensitives.

Subjects: In 1991 ten new regular subjects were recruited, 5 women and 5 men (ages 31 to 51 and 37 to 61, respectively). As in Experiments 1 and 2, all were college graduates and most were Menninger staff members.

Instrumentation and Procedures were the same as in Experiment 2 (15 weekly 45-minute double-blind experiential sessions in the four-wall lab).

Table II

Numerical assessment of 24 typical NCTT body-potential surges (from a data base of approximately 300 NCTT surges) seen in the electrometer records of 7 (of 9) NCTT therapists who produced surges during sessions with patients. Therapists 1 and 2 each produced less than 4 surges, total, in all their sessions. Gothic numbers indicate that patients were with the NCTT therapist in the copper-wall room. Italic numbers indicate that patients were "at a distance," four rooms away from the copper-wall room.

NCTT Therapist Number	Body Potential at Surge Baseline (volts)	Surge Duration at 1/2 Max. Amplitude (seconds)	Maximum Change from Baseline (volts)
1	23.8	0.5	-62.3
1	38.1	2.6	-62.4
1	0.2	0.7	4.2
2	7.2	0.6	17.8
3	0.8	0.3	- 4.6
3	-0.8	0.6	-24.8
3	-2.2	0.4	-11.8
3	-0.4	0.6	- 6.2
7	46.8	0.3	-40.4
7	19.6	0.3	- 10.5
7	12.7	0.3	- 8.9
7	44.5	1.0	19.6
8	-8.1	1.3	10.2
8	-7.8	5.0	6.6
8	3.6	0.9	-12.9
8	-2.4	3.5	- 4.1
9	3.6	0.7	- 9.8
9	3.4	1.9	-12.5
9	2.4	0.5	-11.4
9	5.6	0.1	- 6.6
11	43.9	1.3	-44.4
11	35.2	1.7	-22.8
11	128.4	2.1	-52.6
11	121.3	0.8	-21.1

TABLE III

Mean NCTT baseline levels during P_b surges of the 7 NCTT therapists of Table II, compared with P_b baseline data from both regular subjects and sensitive subjects 30 minutes into meditation sessions. Positive and negative baselines are analyzed separately.

Group	P_b Baselines	Mean Baseline (volts)	SD (volts)
7 NCTT Therapists in therapy	67% Pos.	31.7	38.8
	33% Neg.	- 3.1	3.4
10 Regular Subjects in meditation	92% Pos.	2.8	1.3
	8% Neg.	- 2.0	5.1
14 Sensitive Subjects in meditation	61% Pos.	1.8	2.0
	39% Neg.	- 1.3	1.8

Results: Experiential data have not yet been analyzed, but in the electrical domain, *electrometer records showed no P_b surges that reached 4 volts.* This result differs considerably from Experiment 3 with meditating sensitives. A listing comparable to Table I would be filled entirely with zeros. P_b baseline levels gradually became *positive* in 92% of the sessions ($m = 2.8$ v, $sd = 1.3$ v, 30 minutes into the session), and became *negative* in 8% of the sessions ($m = 2.0$ v, $sd = 5.1$ v). The relatively large sd in negative-going baselines was caused mainly by one subject whose 30-minute P_b level was -15.5 v.

DISCUSSION

P_b and wall-voltage data from sensitives support the hypotheses that during meditation P_b and wall-voltage phenomena are found in and around their bodies, and in greater abundance than with regular subjects. However, using 4 volts as the “significance threshold” for surge data obscured smaller surges in regular subjects that, with feedback practice, may have been increased in magnitude. For example, one *regular* subject, a medical doctor who partici-

pated in the 45 meditation sessions of Experiments 1 and 2, produced in the 44th session significant surge data for the first time. Namely, 3 surges of 12-volt amplitude. No other regular subject (none of whom attempted NCTT therapy, please note) surmounted the 4-volt threshold.

Figure 3.4 was selected for inclusion in this report not only as an example of typical surge duration-and-amplitude characteristics, but because the 2 surges shown were separated by a few seconds in which the *therapist moved the right hand* in the air (with left hand and body motionless) in a circular arc of approximately 15 cm diameter, about 5 cm above the patient's head. Each circular pass seen in the two-camera video record produced one of the sine-like voltage waves (averaging 2.8 v peak-to-peak) seen between the two surges of the P_b record. It is interesting, and perhaps noteworthy, that this NCTT body-motion artifact was generated from a P_b baseline of 46 volts with a relatively *small* hand movement, and is more than 5 times larger than the 0.5 v artifact generated by control subjects during a *large-movement* head roll with body-potential baseline near zero.

Artifacts: Single Wall Lab. During Experiment 1, the only single-wall experiment, the Beckman differential-input electrometer that measured wall potentials had a low noise level due to its relatively high common-mode rejection (in comparison with the single-ended Keithley electrometers used in Experiments 2, 3, and 4). This electrometer made it possible to run sessions with a wall-voltage sensitivity of 20 millivolts/cm (and less) on polygraph channels. Under this condition, 600 sessions were run with regular subjects, and 25 control sessions were run with no subject in the copper room.

The only significant artifact sources found in this system were *body motion* of the subject, or persons *walking past* the closed wooden door of the copper room. To reduce the latter artifact, the door was covered with sheet steel and grounded. In order to eliminate this problem entirely, however, whenever sessions were run the lab was isolated from the rest of the basement with ropes and warning signs. As a further check for artifacts, the system was tested with persons walking on the floor above the lab. This had no noticeable effect on copper-wall voltages.

Also, during Experiment 1 a Hewlett Packard magnetometer was used in the copper room to monitor magnetic variations. By nulling its single-axis probe

(turning the probe axis perpendicular to earth field) field changes as small as 0.01 milligauss were detectable. If the building's elevator came down to the basement, or a steel chair were moved in the control room, or the basement shop's exhaust fan were turned on, the magnetometer's polygraph record indicated the event. No such magnetic events, however, had any noticeable effect on copper wall voltages.

Artifacts: Four Wall Lab. During Experiments 2, 3, and 4, the Beckman electrometer was replaced, as previously noted, with single-ended Keithley electrometers. With these instruments, since there was no differential common-mode rejection, the electronic noise-level increased. This was not a problem, however, because the electrometers were used at 0.01 to 0.001 of the previous sensitivity, and previous tests for detection of artifacts were repeated. The only significant artifact found was *body motion* of the experimental subject.

In addition, since the first author had a distrust of instrumental reliability, especially model-shop electronic fabrications (in consequence of his previous work as a physicist developing data-reduction systems in U.S. Navy rocket and guided-missile research), a system was devised to run simulated copper-wall and psychophysiologic signals through the network of detectors and amplifiers as a check against electronic cross-talk. This was done by generating computer signals in the control room (with proper output impedance, of course) that simulated electrophysiologic and copper-wall behavior, then feeding these signals by cable into the input-end of the system (in the copper wall room), and comparing the return signal with the original computer-generated function. In this way, if back-plane cross-talk between supposedly independent wave forms were detected, it could be traced and eliminated. This was necessary a few times during the perfection of electronic-hardware operational functions, and was completed in advance of Experiments 3 and 4.

Since body-motion could generate a significant spurious signal in the four-wall system, the four video cameras whose functions have been previously described were added to the lab, and during data-reduction all body-potential excursions that appeared to be P_b surges were checked against the two-camera video record made in the copper room to assure that either "no motion" occurred, or "low movement" motion, with amplitude below the threshold previously described.

Figure 3.4. From a glance at Figure 3.4, it seems that whatever the origin of P_b surges (and Figure 2 is representative of at least 200 NCTT surges) the total charge on the body during the surge remained constant. This is inferred from the fact that recovery phase of a surge generally returned to baseline. Presumably, if charge were emitted from the body, the recovery phase of a P_b surge would *not* return to the pre-surge baseline.

First surge hypothesis: *Surges similar to those of Figure 3.4 suggest an oscillation of charge in the body rather than a change in quantity of charge.* One test of this “charge oscillation” hypothesis might be made, of course, with multiple independent electrometers attached to the body. For instance, one electrometer attached to the ear, a second at the ankle, and a third at the abdomen. In this case, an oscillation of charge from head to toe would presumably show equal-and-opposite P_b surges while the abdomen potential remained constant. By way of analogy, ignoring frictional variables, if a half-filled rectangular fish tank is suddenly displaced a bit on its long axis, and immediately returned to its original position, the water level measured at the two ends would show equal-and-opposite transitory change. The level at the center, however, would remain constant.

Second surge hypothesis: *Surges similar to those of Figure 2 suggest an increase of charge in the body, followed by an emission of charge from the body.* Note: This hypothesis was favored by the NCTT therapists in spite of the fact that during NCTT sessions no known physical or physiological mechanism could either increase total body charge, or emit body charge. NCTT therapists, however, generally feel that “therapeutic energy” is something that comes from “outside,” passes through their body, and goes to the patient’s body.

A test of this second hypothesis might be made, of course, with multiple independent electrometers attached to the body as previously suggested, one at the ear, a second at the ankle, and a third at the abdomen. If total body charge suddenly increased and then decreased, all electrometers would presumably show equal-and-similar P_b surges. Again, by way of analogy, if a bucket of water is poured into a fish tank and then dipped out, the water level measured at the two ends and at the middle would show equal-and-similar transitory change.

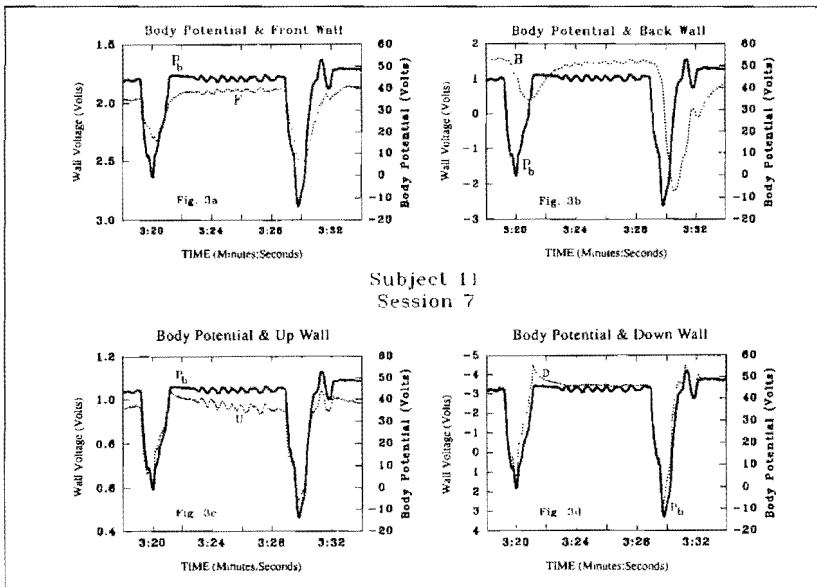
Sensitives vs Regular Subjects: It was hypothesized that during meditation, the electrometer records of sensitives would show significantly larger P_b phenomena than the electrometer records of regular subjects. This was indeed found to be true. Six of the 14 sensitives produced P_b surges larger than 4 volts, ranging as high as 221 volts. In comparison, 10 regular subjects produced no P_b surges as large as 4 volts.

Sensitive's NCTT Sessions vs Sensitive's Meditation Sessions: Only 9% of approximately 300 P_b surges seen in the polygraph records of 42 NCTT sessions have been examined in both digital and video records for validity, whereas all of the 68 P_b surges seen in the polygraph records of 84 meditation sessions have been examined. It is felt, therefore, that a trustworthy statistical comparison between surges per session under the two conditions is not yet possible. It is not out of order, however, to mention that the 4 most prolific surge-generating NCTT subjects together produced more than 220 surges in 16 therapy sessions (4 sessions each). It is also noteworthy that Subject 14 produced 45 surges in 4 therapy sessions,¹¹ but had a flat record during meditation sessions with only one surge greater than 4.5 volts.

The crucial psychological difference between these two kinds of sessions (experiential versus therapeutic) would seem to involve *intention*. NCTT is *intended* by therapists to have an effect on patients. NCTT sessions, in contradistinction to meditation sessions, are externally oriented rather than internally oriented. If this difference in surges per session between external and internal orientation is found in replications of this study, P_b may eventually begin to be thought of as a psychophysiological variable, rather than an electrical-engineering variable, as at present.

Clues for Body Mechanisms: Figure 3.5a-3.5d show the P_b surges of Figure 3.4 graphed with each of the four walls, individually. Note that each wall voltage is expanded, and inverted if necessary, to better show synchronization between P_b and wall response. Synchronization, or lack thereof, between P_b and wall voltages (and among wall voltages) may relate to specific at-present-unknown body mechanisms, such as momentary ion-charge separation, or momentary polarized-molecule alignment.¹²

A gaussian *mass-spectrographic*-like waveform deconvolution of the P_b surge of Figure 3.4, is shown in Figure 3.6 as one type of data reduction method that



Subject 11
Session 7

Figure 3.5a-3.5d. For convenience, the body-potential record of Figure 3.4 (repeated here) is made to remain constant in amplitude in the four graphs, but each wall voltage is amplified (and inverted, if necessary) in order to facilitate time-lock comparisons between body and wall potentials. The delay seen in peak response of the back wall, relative to the instant of peak body potential, has theoretic significance for a study of mechanisms responsible for P_b surges during NCTT therapy sessions.

may be useful for understanding surge mechanisms.¹³ In Figure 3.6 the P_b surge is modeled by: (1) Visually obtaining the single best-fit gaussian curve. This curve is characterized by a formula whose terms give its mean, width, amplitude, and polarity. (2) Subtracting this gaussian curve from the overall surge waveform to produce a "first residual" waveform. (3) Repeating this fitting process on the first residual to get a second gaussian curve and a second residual. (4) Repeating this process with a series of gaussians which are successively subtracted from preceding residuals until the general P_b base-line noise level is reached. The final output of this deconvolution process is a number of gaussian curves and a series of formulae whose terms give a model of the original surge waveform.

From a biomedical-engineering point of view, these gaussian terms may have implications for the number and type of factors involved in producing surges.

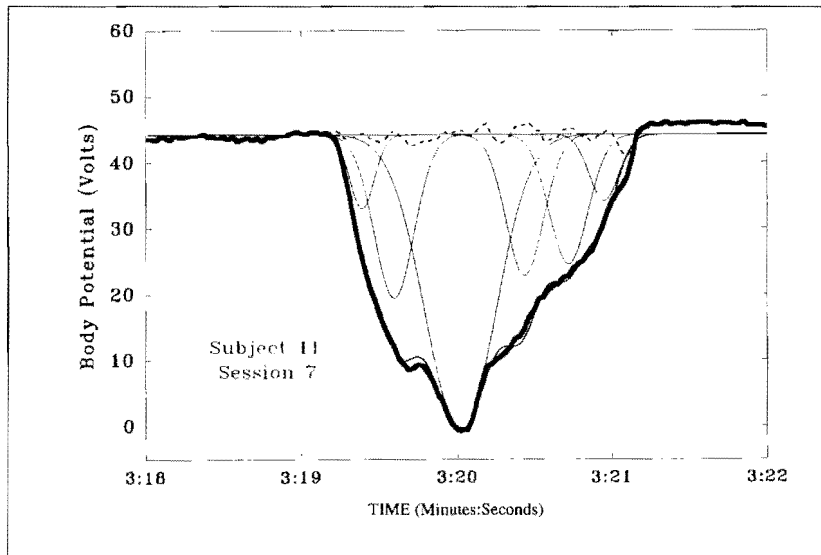


Figure 3.6. The first P_b surge of Figure 3.4 (with an expanded time base) is fitted with a series of summing gaussian waves for a spectrographic-like analysis of the surge. The subtractive residue between the surge and the summing gaussians is seen as the dashed line wandering about baseline level.

A question which is crucial for mathematical modeling and mechanism theory, and which if answered in the affirmative would be of considerable significance, is: Do different NCTT subjects have consistently different spectrographic, spectral, and body-vs-wall desynchronization signatures? A first glance at hundreds of P_b surges seems to imply an affirmative answer, but detailed surge analysis is needed to answer the question properly.

Further Data Analysis. We are proceeding:

1. To study P_b surges of NCTT sessions with gaussian analysis, spectral analysis and other scoring algorithms, to determine whether different NCTT therapists have different analytic "signatures."
2. To examine time-phase relationships between P_b records and the four coincident copper-wall records, for possible indications of biologic mechanisms involved in the production of P_b surges.

3. To examine correlations between P_b surge data and psychophysiologic records, with an eye for clues to biologic mechanisms.
4. To examine, when applicable in *meditation and NCTT sessions*, in sensitives and in regular subjects, correlations between P_b surge data, psychophysiologic records, and magnet orientations.

CONCLUSIONS

1. A technology has been developed for detecting and measuring electrostatic potentials and field effects in and around the bodies of meditators and Non-Contact Therapeutic Touch therapists.
2. During meditation, NCTT therapists (but not regular meditators and not sensitives who were not also NCTT therapists [with one exception]) produced anomalous P_b surges. Specifically, 5 of the 6 sensitives who produced P_b surges during meditation were also NCTT therapists. The implication here is that NCTT therapists have a different "energy structure," or a different "energy-handling capability," from regular subjects and from non-NCTT sensitives.
3. In comparison with the number of surges per session generated during their own meditation sessions, NCTT therapists produced considerably more surges per session during therapy sessions. In other words, the *intention* to be therapeutic during NCTT trials appeared to be positively related to the relative abundance of anomalous P_b surges..
4. The positive relation between *intention* and *surges per session* suggests the existence of a general, but normally-undeveloped, human potential. Some persons may genetically be more talented than others in developing NCTT skills, but the NCTT therapists whom we studied felt, *without a single exception*, that NCTT therapy can be studied and learned in the same way that any other skill can be studied and learned.^{14,15}

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REFERENCES AND NOTES

1. A T. Barker, Editor, *The Mahatma Letters to A. P. Sinnett, 2nd Edition* (P. 455, Letter No. CXXVII, 13 August 1882). (Rider and Co., London 1948), 1st edition 1923.
2. A related double blind experiment with non-contact therapeutic touch therapists was reported by D. Wirth, *Subtle Energies* 1,1 (1989), pp. 1-20. Other related materials

- include studies on (a) the effects of pulsed magnetic and electromagnetic fields on animals and on humans [see M. A. Persinger, *Neuroscience Letter* 88 (1988), pp. 271-274; L. Y. Michaud and M. A. Persinger, *Perception and Motor Skills* 60 (1985), pp. 416-418], (b) studies on the biological and psychological effects of geomagnetic fluctuation, and artificial geomagnetic-like fluctuation (see L. A. Ruttan, M. A. Persinger, and S. Koren, *Journal for Bioelectricity* 9 (1990), pp. 33-54; C. Tart, *Journal of American Society for Psychical Research* 82 (1988), pp. 193-216), (c) the use of Faraday cages during parapsychological research [see C. Tart, *Journal of American Society for Psychical Research* 82 (1988), pp. 129-146], (d) clinical references on the use of magnetic fields for amelioration of human ailments [see W. H. Philpott, *Biomagnetic Handbook*, Enviro-Tech Publisher, Choctaw, OK (1990)], and (e) discussions of electrical, electromagnetic, and magnetic hazards and uses [see R. O. Becker, *Cross Currents* (Jeremy P. Tarcher, Inc., Los Angeles, CA, 1990)].
3. An electrophysiologic measure is the voltage difference between two electrodes on the body. P_b is the voltage difference between earth ground and one electrode on the body.
 4. E. Green, P. Parks, S. Fahrion & L. Coyne, *Subtle Energies* 2,1 (1991), pp. 69-97. Also, in three in-house reports by S. Fahrion, L. Coyne, E. Green, and P. Parks, *Copper Wall Research, Technical Notes 24, 25, and 26* (The Menninger Clinic, Box 829, Topeka, Kansas 66601, 1992).
 5. In order to participate in copper wall research, all subjects signed standard informed-consent forms after reading both the Tibetan instructions and the research protocol.
 6. Construction data for the single-wall lab are in W. Spencer and E. Green, *Copper Wall Research, Technical Note 3* (Menninger Clinic, Box 829, Topeka, KS 66601, 1991). The copper wall room, located in the basement of the Gardner Murphy Research Building, Menninger Clinic, is entirely below ground. It measures 2.74 m (north-south) by 5.79 m (east-west). The control room of the lab is located across a hallway. All interior walls are constructed of clay tile cores, expanded metal lath, concrete and plaster. Grounded conduit carries AC and DC power, and metal ductwork serves heating and air conditioning. The lab has its own temperature and humidity control system, separate from the rest of the building. Standard roofing copper 0.61 mm thick was chosen as the wall's surface material. Three 91 cm x 2.13 m sheets mounted vertically on side-by-side frames (made of wood and other non-ferrous materials), bonded together with copper strips, gave a single copper surface 2.13 m high by 2.74 m wide. For electrical reference, the back of the supporting framework was covered with 0.10 mm aluminum sheets, also bonded together, giving a matching aluminum wall 10.2 cm from the copper. The copper-and-aluminum structure was isolated from ground with glass construction blocks and the subject's chair was electrically isolated by mounting it on a plywood base having glass blocks adhesively bonded below each corner. Comparative electrical behavior of the pair of insulated metal walls, which were wired into the differential inputs of a Beckman Electrometer Coupler (input impedance 1013 ohms), was recorded on multiple Beckman-polygraph channels with sensitivities ranging from 2 mv/cm to 500 mv/cm. This Beckman electrometer is no longer manufactured.
 7. Construction data for the four-wall lab are in W. Spencer and E. Green, *Copper Wall Research, Technical Note 4* (The Menninger Clinic, Box 829, Topeka, KS 66601, 1991).
 8. Using only the center copper panel of each wall increased the sensitivity of the single-ended electrometer circuits by reducing wall-body electrical capacity. All 12 copper panels of the 4-wall system are backed by matching aluminum panels (8.25 cm away), but only the center aluminum panel is grounded (through its electrometer ground). Resistances to ground ($\pm 5\%$) of the four center copper panels, in gigohms (10^9 ohms)

- were; front, 700; back, 680; up, 640; down, 350. Capacitances including electrometer cables, in nanofarads (10^{-9} farads) were: front, 0.505; back, 0.520; up, 0.528; down, 0.570. Thus, RC time constants, in minutes and seconds, were: front, 5:54; back, 5:50; up, 5:37; and down, 3:20. Typical resistance-to-ground and capacitance of a subject wired for physiologic telemetering were: 40 gigohms and 1.1 nanofarads, with a resultant time constant of 44 seconds. The important point of these very long time constants of the walls, is that wall-voltage shifts induced by P_b shifts closely follow the body's electrical behavior, without significant distortion due to bleed-off of charge.
9. Physiologic signals include left and right occiput EEG, EKG, thorax and abdominal breathing (from belt harnesses), galvanic skin potential (between an ear lobe and a finger), and temperature of the right index finger pad. Subjects wear a "psychophysiological jacket" in which sewn-in shielded wires, originating at a 50-pin connector at the hem, terminate at 6-pin left-and-right collar sockets and 8-pin left-and-right cuff sockets. Subjects are wired up in an adjoining room and, until going to the copper wall room, are free to walk about. This arrangement reduces the "electric-chair effects" of physiologic recording. By the time the plug on the hem of the jacket is connected to the socket of the multi-channel electrophysiologic system, subjects are thinking of meditating, rather than wiring. Output of the self-contained battery-powered psychophysiological system is optically telemetered to polygraphs and digitizers via multi-channel light-emitting diode transmitters and receivers.
 10. E. Green. Correspondence between Stevens' terminal brightness function and the discriminability law. *Science*, 138 (1962), pp. 1274-1275.
 11. Subject 14 was the first of the sensitives, and based on experience with regular subjects, we set the P_b electrometer scale too low and only 1 surge was within its range. What we *now* recognize as high-voltage surges, was then thought to be electrometer malfunction. On examining digital *wall-voltage* records two years later, however, typical-amplitude surge data were found, from which it was *inferred* that in the first four NCTT sessions, Subject 14 had 45 P_b surges over 4 volts.
 12. To delineate characteristics of body mechanisms which might be involved in these anomalous voltage surges, physicist William Tiller of Stanford University is analyzing P_b and wall responses (with the collaboration of physicist Elizabeth Rauscher of MagTech Inc.), for correspondence with dipole and quadrupole theory.
 13. Deconvolution of surges was obtained with a SpectraCalc software program marketed by Galactic Industries, modified to allow visual best-fit of gaussian curves.
 14. For eight years of support of this research we are grateful to the late John E. Fetzer of the Fetzer Foundation, Kalamazoo, MI, and we thank the present Fetzer Institute for funding an additional one and one-half years, providing time to conduct Experiment 4, analyze data, and write reports. We also thank Robert Becker, M.D. and engineer James Beal for comments and advice since 1983; Rex Hartzell and Wendell Spencer of the Menninger Biomedical Engineering Lab for construction of the copper-wall lab; Stacy Anderson for continuous assistance in operations and data handling; Kaye Norris for help in conducting Experiment 1; Gay Hoefer, Duane Callies, and Earl Campbell for help with data reduction; and Robert Shellenberger and Judith Green for reading and commenting on drafts of this report.
 15. Finally, researchers and clinicians interested in this technology and the results described above are invited to examine the copper wall laboratory and the data in person. Appointments can be made by phoning Elmer Green or Peter Parks at The Menninger Clinic, 913-273-7500, Ext. 5375.

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