THE JOURNAL OF ALTERNATIVE AND COMPLEMENTARY MEDICINE
Volume 9, Number 3, 2003, pp. 345–353


ORIGINAL PAPERS

# Alterations in Random Event Measures Associated with a Healing Practice

CINDY C. CRAWFORD, B.A.,[1] WAYNE B. JONAS, M.D.,[1]
ROGER NELSON, Ph.D,[2] MARGARET WIRKUS,[3] and MIETEK WIRKUS[3]

## ABSTRACT

**Objective:** To determine whether alterations in random events, as measured by a Random event generator (REG), occur in association with a bioenergy healing practice.

**Design and setting:** Two REGs were set up and run in parallel: one in a bioenergy healer's office and another at a local library as a control. Two multiday sets of data were collected in each setting. A third set was collected in which a reduced amount of attention was placed on the REG by the healer. REG excursions were calculated and compared for (1) overall days in the library and bioenergy healer's office, (2) healing and nonhealing phases in the healing office, and (3) overall excursions during high(sets 1 and 2) and low attention (set 3) by the healer.

**Results:** The library REG produced excursions outside the 95% confidence interval (CI) on 35 of 61 days (58%), and the REG in the healing practice 47 of 51 days (92%) (mean difference, 34%; 95% CI, 18% to 49%; $\chi^2 = 16.3$, 1 *df*, $p < 0.0005$). In the healer's office, 0.6496 excursions per segment for healing phases and 0.6548 excursions per segment for nonhealing phases were shown ($t = -1.3$, 6794 *df*, $p = 0.182$). A comparison with chance expectation derived from Monte Carlo runs showed significantly less mean excursions per segment ($t = -7.8$, 36625 *df*, $p < 0.0005$) for healing phases and no difference in nonhealing phases ($t = -0.16$, 6309 *df*, $p = 0.872$). There was no significant difference in excursions between the high-and low-attention situations in the healing practice.

**Conclusions:** In the presence of a healer, an REG produced greater than chance excursions more often than a control REG in a library setting. The healing and nonhealing phases demonstrated inconsistent results. REG deviations were not influenced by the amount of attention directed toward the machine.

## INTRODUCTION

Healing by intention (HI) or bioenergy healing has been part of all cultures for millennia. It can take the form of spiritual or mental healing, prayer, shamanism, and ritual. HI involves the use of focused intention for the purpose of restoring order and for alleviating

[1]Samueli Institute for Information Biology , Alexandria, VA; and Uniformed Services University of the Health Sciences, Bethesda, MD.
[2]Princeton Engineering Anomalies Research Laboratory, Princeton, NJ.
[3]BioRelax, Bethesda, MD.

The views, opinions and assertions expressed in this article are those of the authors and do not reflect official policy of the Department of the Army, Department of Defense, or the U.S. Government.

suffering and distress. Bioenergy healers (such as practitioners of Therapeutic Touch and *qigong*) attempt to apply HI in sessions with clients or patients and claim that the process results in the exchange of some type of vital energy. Other healers attempt to heal at a distance using practices in which mental or spiritual influences are said to be involved.

Healers claim to use their energy (or spiritual forces) to return clients to a state of homeostasis and improved health. While the value of HI has not been unequivocally established, many clients report benefit from healing sessions and there are a handful of randomized clinical trials suggesting that HI is helpful under certain conditions (Astin et al., 2000; Harris et al., 1999; Sicher et al., 1998).

A key question about therapeutic encounters in medicine is: How do the intended effects of a therapeutic interaction affect the outcome? One explanation invokes a process whereby HI actively reduces disorder (entropy) in the environment. The concept is that engaging in a healing encounter alters the degree of disorder in the space associated with that encounter, resulting in increased order and homeostasis for the patients. It is known that the rate of healing in placebo groups correlates significantly with the rate of healing in the treatment groups of clinical trials (Kirsch and Spirstein, 1998; Moerman and Jonas, 2000; Walach et al., 2001). One possible explanation for this is that the intention for healing by both the practitioner and patient influences treatment and placebo groups equally. Understanding and being able to measure how intention influences healing environments is pertinent for investigating mechanisms involved in all therapeutic settings.

An objective measurement of healer activity would allow for more rigorous evaluation of healing mechanisms and effects. The simplest and most studied system currently available is the random event generator (REG). REG experiments involving mind–matter interaction have now been going on for more than 20 years. A total of 516 experiments published in 216 articles by 91 different first authors examined attempts by individuals to influence REGs. A meta-analysis conducted by Radin and Nelson (Radin and Nelson, 2003) found that although the magnitude of the overall effect was small (on average less than 1%) the results are highly statistically significant ($p < 10^{-16}$), have been replicated by many independent investigators, and are consistently positive.

The use of REGs in the study of human intention have been pioneered and developed by Robert Jahn, Ph.D., and colleagues at the Princeton Engineering Anomalies Research (PEAR) Laboratory, Princeton, NJ. They are used as a tool for evaluating intentional influences on physical systems and alterations of entropy in association with conscious activity (PEAR Laboratory, 1998). The REG is an electronic device with a noise source the output of which is transcribed into a regularly spaced string of randomly alternating binary pulses. A computer counts, displays, and continuously records these pulses (Jahn and Dunne, 1987). A change in the random behavior (and so presumably in entropy) of a system is detected by deviations in the pattern of random electronic events during an intentional episode. These deviations are called excursions when they go beyond the 95% confidence interval with at most 5% chance expectancy.

Portable REGs with software to record and index continuous sequences of binary data have been used in field situations. It has been reported that alterations of consciousness such as focused intention, group attention, shared emotions, and other coherent qualities in various group and individual situations or during rituals and at sacred environments correlate with statistically unusual deviations from theoretical expectation and baseline REG measurement (Nelson and Radin, 2003).

We used this measurement technique to investigate whether alterations by REG excursions occur in an individual healing practice. The hypotheses we tested were:

1. That the REG excursions will be more frequent in the healing practice than in a library.
2. That the REG excursions will be more frequent during healing phases than nonhealing phases within the healing practice.
3. That the REG excursions during reduced attention will occur at the same frequency as the REG excursions during high attention.

## MATERIALS AND METHODS

Deviations from expected random behavior were measured by a portable REG calibrated by the PEAR Laboratory. All calibration and programming of the machines was done and checked at Princeton and is described in their technical reports (PEAR Laboratory, 1998). The FieldReg data program runs on a DOS-based computer. The program generates a data file of consecutive trials and a corresponding index. The index records time, trial number, and any information corresponding to a preset or concurrent mark made using defined function keys to indicate events such as the beginning and end of healing phases. There are approximately 74 trials per minute. An analysis program permits specification of the beginning and end of data sequences to be analyzed, and generates a statistical analysis of the data distribution. A graph displays the deviation of the specified data sequence from expectation, marked with a vertical line at each point where a function key code was entered. Each mark is accompanied by a 5% confidence parabola that starts at the beginning height of the cumulative trace for that segment so one can visually assess the trends corresponding to the identified events or time periods (Nelson et al., 1996). Figure 1 shows an example of the graphic display during two separate phases. Arrows have been inserted to show where the excursions occur (each time there is a deviation that goes outside and beyond the 95% confidence parabola, where there is only 5% likelihood that this occurrence was by chance). Our primary outcome measure was the number of excursions occurring in the experimental location and during the selected phases of healing. These excursions are hypothesized to indicate a change in the entropy of the assembled environment.

The healing practice studied was that of Mietek Wirkus, of Bethesda, MD. (www.mietekwirkus.com) Wirkus is an internationally known healer, originally from Poland, who works with clients individually in his office. His clients go to him for a variety of reasons, but frequently suffer from chronic conditions, medical and otherwise. He makes no medical diagnoses nor does he claim to treat disease. Rather, Wirkus helps to balance, shift, or otherwise transmit bioenergy to his client. Each session with a client lasts approximately 15 minutes (1110 trials according to the REG). Clients and the healer usually stand during sessions in the middle of a 16 × 20 foot room maintained at a constant temperature (62°F) and light conditions. Patients are personally greeted and ushered in and out of the room by Wirkus, who begins to assess the client's energy needs immediately on greeting them. The healer briefly asks what the problem or need is and then begins simultaneously "scanning" the client's body by waving his hands and breathing using a special technique (Fig. 2). Details of his method are described at his Web site and are available through training classes he conducts in Bethesda, MD, and around the world.

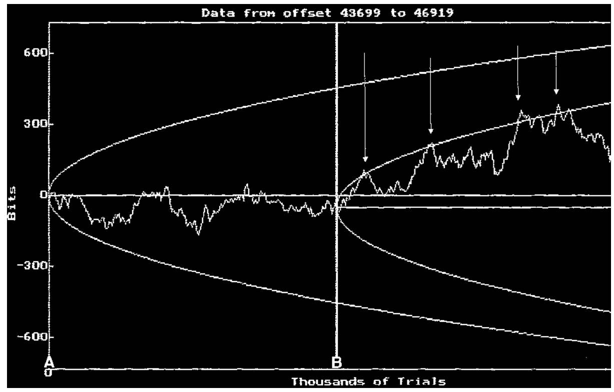


**FIG. 1.** Data showing excursions during a healing session. Intervals A–B mark a healing session, and B–A[1] mark a nonhealing session. The arrows have been inserted into this graph to show where excursions occur (each time there is a deviation that goes outside and beyond the 95% confidence parabola).

A portable REG was placed on a table at one end of the room where sessions with clients take place. These therapeutic encounters served as the healing intervention and experimental condition. Another portable REG used to collect control data, approximately 5 miles away, was placed in the university library at the Uniformed Services University of the Health Sciences, Bethesda, MD. We thought that this library setting (that was maintained at a constant temperature of 65°F) was an entropically neutral place to run the control where relatively mundane interactions occur. We did not monitor the number of persons coming in and out of the library versus the healing practice. However, it is believed that physical presence should not affect the REG data. REG devices

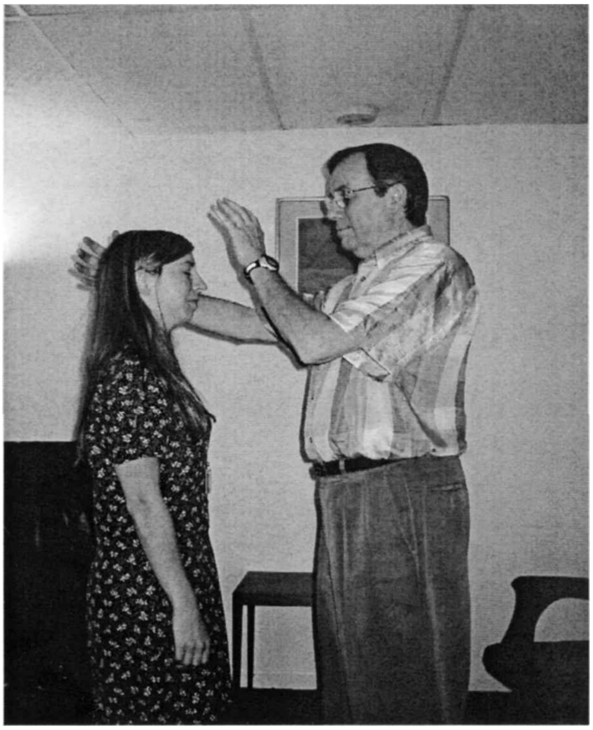

**FIG. 2.** Mietek's healing practice where the random event generator sits on the table behind him and he performs his healing sessions with a client who is centered in the room.

have been extensively calibrated in environments where there was regular human activity going on or other physical devices in operation and simultaneously showed no effect on the random nature of the output distributions of the data (Jahn et al., 1997).

All REGs from the PEAR Laboratory are calibrated using 1 million trial datasets to determine whether they meet the design specification, namely, that the REG behavior should not be distinguishable from theoretical expectation. When two devices meet this specification, they are necessarily indistinguishable from each other. Thus, a calibrated second REG could be used as a control for the first. The library REG ran Monday through Friday, and on occasional Saturdays, from 9:00 AM to 4:30 PM. The REG in the healer's office ran on those days he saw clients (Tuesdays, Thursdays, and Saturdays). His sessions occurred between 10:00 AM and 3:00 PM with no lunch breaks.

*Experiment 1*

The REG was turned on 30 minutes before healing sessions began and ran 30 minutes after all sessions were finished for the day. REGs were not left on during the night or on off days because another practitioner uses the space for classes and a practice during the times that Mietek is not seeing clients. The healer attended to the machine by marking the REG output with function keys to indicate the beginning (A) and end (B) of each client's session. Thus, the A–B time interval indicated the healing phases and the B–A[1] time interval the nonhealing phases. During these healing sessions, Mietek's intention is to help the client rather than influence the REG. The REG at the library collected parallel control data at the same time as the one in the healer's office. The healer's assistant recorded the date, time of session, and any comments about the session to correspond with what the index on the REG produced. This set of data was collected September through October 1999.

*Experiment 2*

The data for experiment 2 was collected in the exact same manner as the first experimental set. This data was collected from January to April 2000.

*Experiment 3*

A third set of data was collected to control for the amount of attention paid to the REG by the healer. In this experiment, the healer did not mark on the REG either when healing was taking place or when it was not. Instead he only turned the REG on in the morning and then turned it off in the evening, similar to the library REG. During this series, he was asked to ignore the REG at all other times during the day. This served as a low-attention dataset. These data were collected between January and April 2001.

## STATISTICAL ANALYSIS

After data collection, the REGs were sent to the PEAR Laboratory, where the data were downloaded into files called field.dat and field.idx, readable by the MS-DOS programs used for analysis. Programs used to assist in the analysis of the data included palmstat, excursl.exe, and exseg.exe, all custom software created at the PEAR Laboratory. The primary author of these programs is York Dobyns, Ph.D., and they have been tested and calibrated for use in the FieldREG research program at the PEAR Laboratory (Nelson et al, 1998; Radin and Nelson, 1989). In palmstat, phases (as marked with the function keys on the REG) are analyzed and produce graphs indicating where excursions occur. Excurs-l.exe counts the total number of excursions outside the 95% confidence interval. We counted excursions by hand and then checked these against excurs-l.exe to determine whether overall days were significantly different between the healing environment and the library. Exseg.exe works like excurs-l.exe except that it reports on uniform length segments that can be compared to each other. Each segment for this analysis was defined as 20 trials. This was needed to compare healing and nonhealing phases because they were different in length. The rate of excursions per segment was examined for the healing and nonhealing phases. SPSS 9.0 (SPSS Inc., Chicago, IL) was used to analyze all data using the $\chi^2$ method for binary outcomes and $t$ test analysis for independent measures as described below.

*Daily excursions*

When there was at least one excursion during a day at any time while the REG ran continuously, it was labeled a "hit." If there were no excursions in a day it was labeled as "no-hit." The number of days with hits and no-hits were then placed into a $\chi^2$ table to test whether the overall days were significant when compared to the library control data. We did not adjust for the duration of REG runs, which provides a relatively conservative estimate of REG deviations in the experimental situation because the library data were collected for 1 hour longer per day on average than the REG in the healer's office.

*Healing versus nonhealing phases*

A similar procedure was done for healing and nonhealing phases as was done for daily excursions. There were approximately 18 healing sessions per day. For this analysis, the nonhealing phases (B–A$^1$) served as the control for the healing phases (A–B). Because average healing phases last 15 minutes, while nonhealing phases are usually only 2–5 minutes, these phases required adjustment for time in each condition. Exseg.exe was used to create uniform segments for each range of individual healing and nonhealing sessions. Approximately 56 segments make up a healing session and each 3.7-segment is approximately 1 minute. Excursions per segment for healing and nonhealing phases were compared using $t$ test procedures.

The expected rate of excursions outside and beyond the 95% confidence interval is a function of segment length; the longer the segment, the more likely it is to penetrate any given envelope purely by chance. This excursion rate was estimated empirically by a Monte Carlo procedure (by generating a large number of synthetic segments of different lengths with pseudo-random data) because it is difficult to calculate on theoretical grounds. Because these pseudo-random segments are constructed in accordance with the null hypothesis, they provide a valid quantitative estimate of the excursion rate expected by chance at various lengths and therefore allow for comparison between the observed excursion rates for segments of differing length. This would allow us to judge whether something unusual happened in the experiment or not. We compared chance expectation produced from the REG alone, derived from million-iteration Monte Carlo runs, to healing and nonhealing excursions per segment using $t$ test procedures to determine if excursions occur more in either phase than they should by chance. This Monte Carlo analysis was only done for exploratory purposes and was planned after completion of the study.

*Controlled attention during healing practice*

This set of data directly compared the two high-attention datasets with the low-attention dataset to determine if the attention placed on the REG by the healer influenced the REG results. As in the first experiment, we analyzed the frequency of days with excursions for all sessions using $\chi^2$ procedures.

## RESULTS

*Library versus healing practice*

As can be seen in Table 1, REG excursions occurred on 92% (47/51) of the days in the healing practice and 58% (35/60) of the days in the library. The increased frequency of days with excursions in the healing practice was found in both experiment 1 (mean difference 35%; 95% confidence interval [CI], 7%–62%; 1 *df*; $\chi^2 = 5.7$; $p = 0.017$), and in experiment 2, (mean difference 32%; 95% CI, 12%–50%; 1 *df*; $\chi^2 = 9.9$; $p = 0.002$). Combined data for the two experiments showed that over the course of the day, excursions occurred statistically more in the healing practice than the library setting (mean difference, 34%; 95% CI, 18%–49%; 1 *df*; $\chi^2 = 16.3$; $p < 0.0005$).

*Healing versus nonhealing phases*

The rate of excursions per segment in the nonhealing phase for experiment 1 proved to be statistically more than during the healing phases (mean difference, 3%, 95% CI, 2.4%–4.1%, $t = -4.5$, 2235.6 *df*, $p < 0.0005$). For experiment 2, the rate of excursions per segment in the healing phase was statistically indistinguishable from the nonhealing phase (mean difference, 0.8%, 95% CI, 0.26%–1.4%, $t = 1.8$, 4562.4 *df*, $p = 0.076$). This is a marginal outcome, and it is worth noting that if equal variances are assumed, which we are not assuming for all of these analyses, the healing phases show statistically more excursions per segment (p = 0.004). Returning to the more conservative analysis, the combined data show no statistical difference between healing and nonhealing phases for rate of excursions per segment (mean difference 0.5%, 95% CI, 0.24%–1.3%, $t = -1.3$, 6794.5 *df*, $p = 0.182$) (Table 2).

We decided to examine the Monte Carlo analysis because these results were not reproduced. It is known that these types of effects produced from the REGS occurs only 50%–70% of the time and that the effect usually deteriorates from the first experimental runs, but then returns to a higher performance in the fourth experiment or so (Jahn et al., 2000) Chance excursions from the Monte Carlo runs show 0.655449 excursions per segment when allowing the REG to run 1 million iterations counting excursions during 20 trial segments. Using these comparisons, we found no difference between chance expectation and the rate of excursions occurring during healing phases for experiment 1 (mean difference, 0.09%, 95% CI, −0.36%–0.18%, $t = -0.67$, 11427 *df*, $p = 0.502$). However, for experiment 2, healing phases show statistically fewer excursions per segment than chance expectation (mean difference, 0.8%, 95% CI, 0.63%–0.98%, $t = -9.05$, 25197 *df*, $p < 0.0005$). The combined data show that excursions per segment occur statistically less than chance during actual healing phases (mean difference, 0.58%, 95% CI, 0.44%–0.73%, $t = -7.8$, 36625 *df*, $p < 0.0005$). Statistically more than chance excursions per segment occurred during nonhealing phases in experiment 1 (mean difference, 3%, 95% CI, 1.8%–4%, $t = 4.4$, 2077 *df*, $p < 0.0005$). In experiment 2 we saw the exact opposite effect: excursions per segment occur statistically less than chance during nonhealing phases (mean difference, 1.6%, 95% CI, 0.74%–2.5%, $t = -3.58$, 4231 *df*, $p < 0.0005$). The effects cancel each other when data from both the experiments are combined and the overall rate of excursions during nonhealing phases is indistinguishable from chance expectation (mean difference, 0.06%, 95% CI, −0.8%–0.69%, $t = -0.16$, 6309 *df*, $p = 0.872$).

*Control of attention data*

Data collected under conditions of high attention, when the healer was marking the beginning and end of all sessions (average 30 times a day), showed that excursions occurred

TABLE 1. FREQUENCY OF DAYS WITH EXCURSIONS FOR THE REG RUNS

| | | *Experiment 1* | *Experiment 2* | *Combined data (1+2)* |
|---|---|---|---|---|
| Days during which the REG runs | In library (control) | 15/28 (53.6%) | 20/32 (62.5%) | 35/60 (58%) |
| | In healing practice | 15/17 (88.2%)* | 32/34 (94%)* | 47/51 (92%)* |

*Significance $p < 0.05$ between library and healing practice.
REG, random event generator.

TABLE 2. FREQUENCY OF EXCURSIONS PER SEGMENT FOR HEALING AND NONHEALING PHASES IN THE HEALING PRACTICE

| | | *Experiment 1* | *Experiment 2* | *Combined data (1+2)* |
|---|---|---|---|---|
| Phases during which the REG runs | During healing phases | 7480/11428 (65.45%) | 16313/25198 (64.74%) | 23793/36626 (64.96%) |
| | During nonhealing phases | 1427/2078 (68.67%)* | 2705/4232 (63.92%) | 4132/6310 (65.48%) |

*Significance $p < 0.05$ between healing and nonhealing phases.
REG, random event generator.

on 47 of 51 (92%) days. When attention to the REG was reduced by the healer to only turning the REG on in the morning and off in the afternoon (2 times a day), excursions occurred on 24 of 30 (80%) days (mean difference 12%; 95% CI, 2.85%–27%; 1 *df*; $\chi^2 = 2.6$, $p = 0.108$). Thus the amount of attention that the healer placed on the REG did not significantly alter the results.

## DISCUSSION

Previous research has shown that REGs of various types are influenced by individual intention and during cohesive group activity. For example, a total of 516 experiments published in 216 articles by 91 different first authors indicate that there are ways in which mind and matter directly interact to alter such random systems (Radin and Nelson, 2003). In addition, it has been shown that coherent activities of groups such as during Princess Diana's funeral (noosphere.princeton.edu/rdnelson/diana.html) or the September 11, 2001 terrorist attacks were also associated with altered REG excursions (noosphere.princeton.edu/terror.html). In a database of approximately 80 independent applications, group activities categorized as "resonant" and characterized by "deep engagement" show a significant tendency to depart from expected random number variation ($p = 2 \times 10^{-6}$), compared to data taken in "mundane" situations which show no significant deviation (Nelson and Radin, 2003).

It is our interpretation that deviations from chance in REG measurements reflect a change in entropy (increase in order or negentropy) associated with the healer's environment. If a decrease in entropy occurs in a healing space, this could be a mechanism for increased homeostasis perhaps via absorption of negentropy by the client. Presumably, the library environment expresses a baseline state of entropy for comparison. If the REG deviations were the result of the attentional effects of the healer toward the REG, one would expect more deviations during high-attention conditions than low-attention conditions. However, the frequency of occurrence of REG deviations during high- and low-attentional conditions was not statistically different, and both conditions showed higher REG excursion counts than were found in the library control condition. We interpret this to indicate that alterations in entropy are associated with the healer's environment and are not dependent on the attention directed toward the machine by the healer. Thus, the REG device may act as an independent detector of altered entropy in the space of the healer's office and may provide a method of measuring the presence of healing activity. We currently do not know how to distinquish this effect from group activity effects such at September 11, 2001, terrorist attacks. Further research may be able to distinguish these different types of effects on REGs.

We expected more REG deviations to occur while the bioenergy practitioner was actively engaged in bioenergy healing than between healing sessions. However, we found mixed results. There were significantly more excursions while clients were being ushered in and out of the office during the first experiment, yet not during the second experiment. During previous experiments at the Menninger Clinic that measured electromagnetic vectors produced by Mietek in a copper room, electrical discharges from his body were higher immediately after he ended healing sessions (Fahrion et al., 1992).

If there is a period where maximum entropy fluctuations occur during healing, our data weight more heavily toward it being between sessions, rather than during the identified healing phase. We did not measure electromagnetic field effects in the room. It is speculated that there could also be a lingering effect (Tiller et al., 2001) that would produce the same number of deviations during nonhealing sessions as healing sessions. However, this did not happen. The Monte Carlo analysis was done for exploratory reasons to try and gain more information about healing and nonhealing phases because our original analysis led us to inconsistent results. This analysis led us to believe that during healing phases, there is a sense of stability in the healing environment and during nonhealing phases entropic changes seem to occur in our first set of data but not in the second set. It is difficult to know how to interpret this and more data need to be collected.

The PEAR Laboratory describes a "series position effect" that is a frequently observed phenomenon in these REG studies. The "series position effect" relates to the evolution of operator performance as a function of the number of experimental series performed. The trend noticed is that effects are greatest for the first series of experiments, deteriorate for the next two, and return to a higher performance for the next three experiments. Boredom, anxiety, overconfidence, and learning by the operator may cause these alterations in the REG (Jahn et al., 2000). Mietek, who was the sole operator of the REG, enjoyed working with it. However, there was no evidence of a deterioration of the three studies or during any single data set collection. We also believe there was not enough data collected to see this effect.

There are several limitations to this study. First we cannot measure entropy directly so we cannot determine for certain that entropy is involved in these readings. Second, we have only tested two sites and cannot be certain that the library is the best control situation for a healing practice. Other sites should be tested, including clinics, operating and recovery rooms, offices, classrooms, other doctors', nurses', and healers' offices. Careful characterization of the nature of human (and perhaps other) interaction is needed in those environments. A REG may be a useful detector of places where healing may be occurring, however, there is currently insufficient data from this and too few other studies to say whether this is possible.

We have found no correlation between REG deviations and physical health improvement as measured through the SF-36 Health Assessment Questionnaire (data not provided). At this time we cannot say how and even if the REG is associated with clinical improvement or if there may be changes in the physical environment around a healer, even though there have been many speculations that changes are detected by machines and biosystems around a healer (Kiang et al., 2002; Tiller et al., 2001). We need further research before we can say with any confidence whether this detection relates to clinical improvement in clients.

In addition, it is unclear if the REG is responsive to a physical or mental space. For example, work from the PEAR Laboratory has shown that REG deviations are nonlocal, occurring at distances and even times remote from the intender (Jahn et al., 1987). Given this, why increased deviations would not occur in the library is unclear. Somehow, one REG and not the other must be linked to the experimental situation. The experimental arrangement may signal which REG is to be affected. We assume that this link is established during the design of the experiment (Walach et al., 2001). However, we are currently unsure how this occurs and how it can be tested until a better model of nonlocal REG deviation is developed. Until then, we believe that the generalizability of REG excursions associated with healing environments should be studied to see if this is a useful method for detecting enhanced healing spaces in a variety of settings. In addition, research should examine further whether increased REG excursions in clinical practice are also associated with increased chance of improvement in patients who attend those clinics.

## CONCLUSIONS

We found that an REG deviates from chance significantly more in the office of a bioenergy healer than in a library. This deviation is consistent, having been observed in three independent data sets each collected several months apart. This implies that alterations in entropy are taking place more often in the healing environment. We did not find that REG excursions occur more during healing phases than nonhealing phases. This needs to be explored further because the results were inconsistent. REG deviations were not influenced by the attention directed toward the REG by the practitioner.

## ACKNOWLEDGMENTS

Thanks are due to the PEAR Laboratory for the use of their REG equipment and York Dobyns, Ph.D., for creating needed programs for us to analyze the data. Thanks to Cathy McClannan, for keeping records on the log sheets in Mr. Wirkus' office. Also, we are grateful to Ron Chez, M.D., for his editorial comments and suggestions on the manuscript. This project was supported by the Samueli Institute and the Laurance S. Rockefeller Fund.

## REFERENCES

Astin J, Harkness E, Ernst E. The efficacy of "distant healing": A systematic review of randomized trials. Ann Intern Med 2000;132:903–910.

Fahrion SL, Wirkus M, Pooley P. EEG amplitude, brain mapping, and synchrony in and between a bioenergy practitioner and client during healing. Subtle Energies 1992;3:19–51.

Harris W, Gowda M, Kolb J, Strychacz C, Vacek J, Jones P, Forker A, O'Keefe J, McCallister B. A randomized, controlled trial of the effects of remote, intercessory prayer on outcomes in patients admitted to the coronary care unit. Arch Intern Med 1999;159:2273–2278.

Jahn R, Dunne B, Bradish G, Dobyns Y, Lettieri A, Nelson R. Mind/machine interaction consortium: PortREG replication experiments. J Sci Exploration 2000;14:499–555.

Jahn R, Dunne B, Nelson R, Dobyns Y, Bradish G. Correlations of random binary sequences with pre-stated operator intention: A review of a 12-year program. J Sci Exploration 1997;11:345–367.

Jahn R, Dunne B. Margins of Reality: The Role of Consciousness in the Physical World. New York: Harcourt Brace Jovanovich, 1987.

Jahn RG, Dunne BJ, Nelson RD. Engineering anomalies research. J Sci Exploration 1987;1:21–50.

Kiang J, Marotta D, Wirkus M, Wirkus M, Jonas W. External bioenergy increases intracellular free calcium concentration and reduces cellular response to heat stress. J Invest Med 2002;50:38–45.

Kirsch I, Spirstein G. Listening to prozac but hearing placebo: A meta-analysis of antidepressant medication. Prev Treat 1998;1:[article 0002a]

Moerman DE, Jonas W. Toward a research agenda on placebo. Adv Mind-Body Med 2000;16:33–46.

Nelson R, Jahn R, Dunne B, Dobyns Y, Bradish G. Field-REG II: consciousness field effects: replications and explorations. J Sci Exploration 1998;12:425–454.

Nelson RD, Bradish GJ, Dobyns YH, Dunne BJ, Jahn RG. Field REG anomalies in group situations. J Sci Exploration 1996;10:111–114.

Nelson RD, Radin DI. Research on mind–matter interactions (MMI): Group attention. In: Jonas WB, Crawford CC, eds. Healing, Intention and Energy Medicine: Science, Research Methods and Clinical Implications. London: Churchill Livingstone: 2003:49–58.

Princeton Engineering Anomalies Research (PEAR) Laboratory. Construction and Use of Random Event Generators in Human/Machine Anomalies Experiments. Princeton: Princeton University School of Engineering and Applied Science, 1998.

Radin DI, Nelson RD. Evidence for Consciousness-Related Anomalies in Random Physical Systems. Found Physics 1989;19:1499–1514.

Radin DI, Nelson RD. Research on mind–matter interactions (MMI): Individual intention. In: Jonas WB, Crawford C, eds. Healing, Intention and Energy Medicine: Science, Research Methods and Clinical Implications. London: Churchill Livingstone, 2003:39–48.

Sicher F, Targ E, Moore D, Smith H. A randomized double-blind study of the effect of distant healing in a population with advanced AIDS. Report of a small scale study. West J Med 1998;169:356–363.

Tiller W, Dibble W, Kohane M. Conscious Acts of Creation: The Emergence of a New Physics. Walnut Creek, CA: Pavior Publishing, 2001.

Walach H, Schmidt S, Bihr Y, Wiesch S. The effects of a caffeine placebo and experimenter expectation on blood pressure, heart rate, well-being, and cognitive performance. Eur Psychol 2001;6:15–25.

Address reprint requests to:
*Wayne B. Jonas, M.D.*
*Samueli Institute for Information Biology*
*121 South Saint Asaph Street*
*Alexandria, VA 22314*

*E-mail:* ccrawford@siib.org