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The Ordering of Random Events by Emotional Expression

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Abstract—The purpose of this experiment was to see whether any correlation could be found between the expression of emotions of patients in Reichian biopsychiatric therapy and the output of an electronic random event generator (REG). Videotaping and coding of therapy sessions were conducted in synchronization with the operation of an REG. Comparisons were made of REG output while patients spoke with neutral emotion and during the spontaneous expression of crying with anxiety, frustration or sadness, and anger. Statistical analysis revealed anomalous REG outputs during periods of emotional expression compared to periods of neutral talking. Periods of the expression of anger compared to those of crying with sadness and/or anxiety were significantly correlated with marked elevations and depression of REG output, respectively. Based on the concepts developed by Jahn and Dunne, as well as Reich, it is hypothesized that the observed effects are due to the establishment of resonance between the therapist/investigator, the emotionally expanding and/or contracting patient, and the REG.

Keywords: REG—emotion—resonance

Introduction

In their experiments on human–machine interactions, Robert Jahn and Brenda Dunne (Jahn and Dunne, 1987; Jahn *et al.,* 1997) demonstrate that the distribution of impulses generated by a random event generator (REG) can be anomalously, marginally shifted from normal either locally or at a distance by active mental intention. They also found that many operators appeared to impose a signature on the REG output, *i.e.,* the *pattern* of output when a particular operator was operating displayed similar directional trends on most runs on the electronic REG and other experimental REG devices. The effect appeared to be equally strong even if the operator was thousands of miles away from the device. The experimenters also found that the REG output during baseline (null-intention) runs was anomalous in that the obtained variance of the REG output was significantly narrower than the theoretical expectation (Jahn and Dunne, 1987). Later studies indicated that the baseline anomalies were strongly correlated with operator gender (Dunne, 1998). These findings indicate that something other than *conscious* intention can apparently affect the REG and do so at a distance.

In their model, Jahn and Dunne define consciousness as all that one identifies as oneself: thought, emotions, physical substance, *etc.* They account for their anomalous finding by hypothesizing a nonelectromagnetic field, through which a state of resonance is established between the operator and the machine.

Given the above findings, and assuming that Jahn and Dunne were correct in including emotions in their definition of consciousness, we reasoned that if other-than-conscious intentions can order the output of an REG, then it was possible that spontaneous, undirected, emotional expression might, in some way, do the same. In the form of psychiatric therapy employed by the author (Reichian biopsychiatry), intense emotional expression by the patient occurs fairly regularly. It was therefore hypothesized that an REG set up in the therapy office 10 feet distant from a patient would be anomalously affected during those moments when the patient would express emotions compared to those times when patients would be emotionally neutral. The present study is an initial survey designed to see whether correlations can, indeed, be found between REG output and emotional expression.

Literature Review

Other than the quantum mechanical theoretical formulations of Jahn and Dunne (1987), there was no reason based upon the findings and theories of classical biophysics to expect any influence on the output of an REG by a spontaneously emoting individual many feet distant from the device. Although it was true, as stated above, that Jahn and Dunne had amply demonstrated that the output of the REG could be correlated with the conscious intention of operators, there was nothing in the literature at the time of beginning the experiments described in this paper that suggested effects of either local or nonlocal *emotional* output on such a device. Since then, the only relevant findings involve the effects of group expression on the REG (Nelson *et al.,* 1996, 1998; Radin, Rebman, and Cross, 1996; Rowe, 1998; Schwartz *et al.,* 1997). Further, a review of the mainstream literature on the biophysical basis of emotions shows that although one can demonstrate myriad physiological parameters that correlate with feelings and expressed emotions, all involved measurements are made either within or on the surface of the body (Panksepp, 1998). Indeed, except for experiments performed by Wilhelm Reich and Harold Burr, I could find no research involving biophysical and physiological parameters of biological or psychobiological functions where measurements were made nonlocally.

Burr observed that an electrical field measured a small distance away from the surface of an unfertilized, biologically undifferentiated salamander egg appeared to have a determining effect on the establishment of the pattern of the future axis of the central nervous system (Burr, 1972). On the basis of his experimental observations, Burr, with F. S. C. Northrop, formulated an electrodynamic theory of life, maintaining that an electrical field was a primary prop-

erty of protoplasm, sustaining pattern in the organism in the midst of physiochemical flux (Burr and Northrop, 1935).

The work of the contemporary biophysicist Mae-Wan Ho at the Open University, London, complements many of Burr's findings. Her analysis of her own and other's experimental work supports the hypothesis that the "organizing embryonic field is global in character, right down to individual macromolecules, and that its major axis is electrodynamic in character" (Ho and Saunders, 1994).

The radiation effects of electromagnetic (EM) fields generated by the acceleration of electrically charged inorganic, organic, and macromolecular ions within the body have been investigated experimentally and theoretically. The waves resulting from the movement of these ions through the body are variously emitted, decay, and are refracted and reflected at organ interfaces, producing interference patterns, which combine according to quantum theory's superposition principle. According to C. Zhang and F. A. Popp, these interference patterns create stable standing waves, which may have a great deal to do with holographic effects seen in the global functioning of the organism and its nonlocal treatment by such modalities as acupuncture (Rubik, 1995). But even in these studies involving EM fields, all measurements were made on or beneath the surface of the body.

Thus, we see that there is at least some basis for the existence of a biofield effect based upon electromagnetism. However, although it is possible that emotional expression could affect an REG through perturbing an EM field emanating from the body or be some component of the elements that generate such a field, the findings and theory of electromagnetism provide no basis for expecting that such a field would extend much further than a few inches from the body. Further, and most important, as Jahn and Dunne note, the experimental phenomena documented in their work with the REG and remote viewing, especially those involving anomalies of time, cannot be explained by electromagnetic theory (Jahn and Dunne, 1987).

A non-EM biophysical basis for the emotions was elucidated by Wilhelm Reich, the Austrian psychoanalyst, who devoted the latter part of his life to the investigation of the nature of life and life energy. In his clinical psychoanalytic and later vegetotherapeutic and orgone-therapeutic work, Reich proposed that emotions were a function of the patient either bioenergetically expanding toward or contracting away from the outer world (Reich, 1949). This amoeboid-like behavior confirmed an earlier postulate of Freud that never took serious root in later psychoanalytic theory. When Reich moved from the classical psychoanalytic technique of free association toward the more confrontive kinds of intervention of the method he called character analysis, he noted that patients more readily gave in to the expression of their previously blocked emotions. When this happened he observed spontaneous pulsatile (clonisms) movements of the patient's body, which at times included the entire torso. These movements were greatly amplified when Reich added massage directed at physical release of the patient's chronic muscular tension (muscular armoring) to his

therapeutic armamentarium. Reich found that as the characterological and muscular armoring softened in the course of therapy, patients reported feeling electrical currents and sensations of something streaming through their bodies. This was usually associated with an increase in general vagotonic tone, flushing of the skin, brightening of the eyes, contraction of the pupils, slowing of the heart, and an increase in pleasurable sensations at the skin. The opposite of this state of *bioenergetic expansion* was one of *bioenergetic contraction,* usually brought on by fear or anxiety, and characterized by a general autonomic sympathetic tone with pallor of the skin, narrowing of the eyes, dilatation of the pupils, acceleration of heart rate, and sensations of inner tension (Reich, 1942).

In order to objectify these observations, Reich measured bioelectric charge on the skin surface of subjects in a variety of emotional states. He found that the subjective perception of anxiety or sadness was directly correlated ("functionally identical," to use Reich's term) with a *contractive* movement of bioelectricity *away from* the skin surface toward the bioenergetic core of the organism—autonomic neural plexes deep in the abdomen and pelvis. Anger, pleasure, and longing were correlated with an *expansive* movement of bioelectricity from the core *out to* the skin surface (Reich, 1937). These directions of movement were understood by Reich to be mediated by opposing domination of the two different branches of the autonomic nervous system, the parasympathetic in bioenergetic expansion and the sympathetic in bioenergetic contraction. A more recent attempt to replicate Reich's study using modern equipment confirmed in many respects Reich's findings (Braid and Dew, 1988).

Reich found that a bioelectrical interpretation was not, however, sufficient to explain adequately all the phenomena observed in his bioelectrical studies. He then undertook a series of experiments on the sources of energy sustaining life, which ultimately suggested a nonelectromagnetic basis for living processes. In the course of his research, Reich reported experiments in which he postulated a field of bioenergy, orgone energy, surrounding and interpenetrating all living things. Reich's principle device for detecting this field, the orgone energy field meter (Reich, 1948, p. 125) could apparently detect the energy field of a lively human at distances up to 6 feet.[1] The effects of the spontaneous expression of emotions on the meter were not undertaken, as far as I know, although Reich did report that subjects who were more vegetatively alive (capable of the expression of intense emotions) could more readily affect the meter, compared to those who were vegetatively dead, a catatonic schizophrenic or a heavily armored obsessive compulsive neurotic.

[1]This device consisted of moveable facing metal plates, one of which was connected to the different pole of the secondary coil of an induction apparatus. A 40-watt bulb connected between the plates glows when the primary current is at a certain intensity. The proximity of something living to the upper plate affects the intensity of glow of the bulb. The more alive the object the more intense the glow.

Confirmation of Reich's psychiatric, biophysical, and physical findings have been reported in those few contemporary journals devoted to his work (*The Journal of Orgonomy, Annals of The Institute for Orgonomic Science*) but never seriously challenged by reports in the mainstream literature.

Methodology

Reichian biopsychiatry is a so-called depth therapy, whose aim is to free the patient from his characterological and muscular armoring, or blocks, thus permitting the free flow of life energy through the organism (Reich, 1949). In the process, emotions are spontaneously released. The depth of the emotional release is a function of many things, including the layer of the personality or character being addressed at that moment in the therapy, the rigidity of the character structure of the patient, whether hysterical or compulsive, *etc.,* and the energetic charge of the patient in general and on that particular day. Patients usually engage in therapy for several to many years, motivated by the continuing improvement they experience in their sense of internal freedom and well-being, their increased capacity to feel pleasure, and a growing sense of inner strength, personal independence, and the capacity to accept greater responsibility for their lives.

The technique of therapy involves attention to and interventions in the process of verbal and nonverbal interchange between the therapist and the patient plus detailed and consistent attention to the patient's characterological and muscular armoring. Characterological armoring is treated by the therapist's informing the patient through either verbal interventions or mimicry the artificial ways in which the patient appears and behaves. Muscular armoring is the functional somatic counterpart of characterological armoring. Chronic spastic tensions in the striated and smooth musculature are released by deep massage combined with encouraging the patient to express any emotion bound by the armoring.

The first part of each session usually involves talking by the patient as he/she describes whatever is on his/her mind and verbal responses and interventions by the therapist. This is often, but not always, followed by having the patient, prone on the therapy couch, deeply sigh in order to build up a bioenergetic charge. This may, by itself, without any further interventions, be enough to trigger the overt expression of blocked feelings. When the therapist sees that there is no or little energetic movement, he may intervene by describing to the patient a characterologic attitude or state of bodily constraint or by direct systematic work on the musculature to release armoring.

In therapy sessions during the experimental REG periods, the therapist intentionally took a more passive role than usual in order, as much as possible, to avoid adding an unnecessary variable to the experiment. This meant fewer verbal interventions relating to the patients' character and much less work than usual on the musculature. Patients participating as subjects in the experiment were rarely physically touched, and, in the few situations where it was

deemed necessary in order to advance therapy, not more than once during the session.

Study 1

The experiment was conducted in the therapist's (R.A.B.'s) office, a renovated trailer located 30 feet away from his house, in a semirural setting in Northern California, at least 1/8 mile away from the nearest neighbor. Patients were videotaped during each session, while a computer time-synched to the camcorder collected REG data. Patients were informed only that the therapist wished to conduct an experiment with a random event generator, and that part of the experiment involved videotaping of their sessions. All patients gave their permission to proceed and accepted the experimental conditions with no observable inhibition throughout the course of the experiment.

Twelve patients, ranging in age from 25 to 60 years, were initially selected from the therapist's full caseload because they had been coming to treatment regularly, most of them weekly, for at least 1 year prior to the study, and their superficial resistances, including distrust of the therapist and the therapeutic process, had been well resolved. Of the 12 patients three were men. Since it had been the author's clinical experience that emotional expression by men is much more difficult than for women, and in view of the fact that only three men were available for the study, it seemed best to limit the current study to women to optimize the possibilities of seeing some kind of correlation of emotional expression with the REG. It was anticipated that when the therapist's caseload included more men who could qualify for the experiment at a later time, that the current experiment would be repeated using only men.[2] Owing to a technical problem, the data from one of the two therapy sessions of a female patient was not recorded, so she was dropped from the study. Of the remaining eight patient/subjects, characterological diagnoses included hysterical, phallic, and nonpsychotic catatonic schizophrenic character types, using Reich's (1949) and Baker's (1967) character typology.

Videotaping was done with a Sony 8-mm camcorder unobtrusively placed in the office. The camcorder was set to record the time and date of the beginning of the session and to continuously record elapsed time. A portable random event generator, similar to those used in their field REG experiments (Nelson *et al.,* 1996, 1998), was provided by the Princeton Engineering Anomalies Laboratory (PEAR) along with software to provide continuous REG recording to hard disk with built-in statistical and graphing capabilities. According to PEAR, in this device "the random event sequence is based on a low-level microelectronic white noise source which is amplified, limited, and ultimately compared with a precisely adjusted DC reference level. At any instant of time the probability of the analog signal equaling or exceeding the ref-

[2]Dunne (1998) later reported gender differences in studies involving conscious intention on the REG.

erence threshold is precisely 0.5. This white noise signal is sampled 1,000 times per second, and the output of a comparator stage is clocked into a digital flip-flop, yielding a stream of binary events, 1 or 0, each with probability 0.5. This unpredictable, continuous sequence of bits is then compared with an alternating template using a logical XOR in hardware, and the matches are counted, thus precluding first-order bias of the mean due to short or long-term drift in any analog component values by inverting every second bit. The resulting sequence is then accumulated as bytes that are transmitted to a serial port of the computer, where they are read and converted to REG data by dedicated software" (Nelson, 1996). Built-in, fail-safe, and calibration components guarantee the device's integrity against technical malfunctions and environmental disturbances.

Whereas the original PEAR experiments with conscious intention used a tripolar protocol, the field REG version used in this experiment had a single null-intention protocol. Data were fed into the computer by the REG in continuous 13-minute, 1,000-trial segments. Except for an indication that the computer was recording data, the screen was blank. Thus, investigator and patient were blind to any results emerging during the session. The device plus attached Zeos laptop computer was located 10 feet away from the patients, out of their line of sight. The camcorder and REG were started within 5 seconds of each other and within 15 seconds of the beginning of the therapeutic sessions. This permitted two or three REG segments to be recorded over the course of a 30- or 45-minute session. Calibration runs were made at intervals during the several months of the experiment when the office was unoccupied during the day and, at times, through the night.

The task of the data analysis was to determine whether any correlation existed between the patient's overt emotional expression and the REG output. For these purposes we considered an emotionally neutral period of talking as one where there was no obvious elation, anger, anxiety, or depression being expressed by the patient as she spoke with the therapist at the beginning of each session. Segments registered as containing emotional expression were those where emotion was actually expressed by either spontaneous overt crying, screaming with fear, reaching out and/or sobbing with longing, or yelling and/or hitting in anger, all of which were seen during the course of the experiment. That is, we distinguished patients' subjective perceptions of emotional states from their overt expression of the state. Patients might feel like they would like to or were going to cry, for example, but this was distinguished from the actual expression of crying with overt sobbing. The former was not considered overt expression, but the latter was. Where the patient was not overtly expressing an emotion such as crying or anger while talking, but the therapist could clearly sense a strong undercurrent of sadness or anger, the segment was excluded from the data analysis. The therapist was highly experienced at making such estimations, having done so for over 25 years of clinical work.

Periods of remarkable pleasure or joy were not seen in any patient/subject during the experimental periods, although most patients reported considerable

relief following the full expression of a blocked emotion. It is usual in this form of therapy for a single emotion to dominate long periods of the session, and this held true for our experimental sessions: In nearly all therapy sessions the time period corresponding to a given 13-minute REG segment was clearly dominated by a single form of expression. This made it fairly easy to label the emotional qualities of most segments. For example, during an initial 5 to 10 minutes of discussion, a patient might evidence neutral affect, then, when lying down and gently sighing, might spontaneously begin to cry. This is not unusual in women in this kind of therapy. Usually sobbing (indeed, any emotion expressed in therapy) is expressed in pulses, that is, several periods of two to three minutes of sobbing separated by one or two minutes of simply sighing or verbalization without overt sobbing. Being constrained by the software to compute in 13-minute segments, we labeled the segment as one of crying despite the fact that the patient did not cry during every minute of the segment. The available software at the time of Part 1 of this study provided only cumulative results of output for each segment; therefore, we could not precisely extract that REG output that correlated with each emotional period during segments where mixed emotions were expressed. In those segments where mixed emotions, such as anger and sorrow, were sequentially expressed we counted the minutes associated with each emotion and labeled the segment according to the dominant emotion. Such segments were rare during the experimental periods.

To minimize the possibility of feedback-driven effects on the REG by the investigator's intentionality, the data from all subjects were analyzed only at the completion of the experiment. The evaluation and labeling of the kinds of emotions expressed during each segment were made by the author. The procedure for matching independent and dependent variables was as follows: The times of the beginning and end of each REG segment were noted, then the dominant emotional expression corresponding to this interval was paired with the REG output during that segment. By observation, we established in Study 1 that we were dealing with five main, easily differentiated categories of behavioral expression—emotionally neutral talking; talking with emotion; sighing without emotional expression; overt crying with fear, anxiety, frustration, or sadness characterized by sobbing with tears; and anger characterized by yelling, and (often) hitting the couch, and/or kicking. One patient also expressed longing through part of a segment of a session: This was characterized by her crying with reaching out with the arms and verbalizations of "wanting mother." We limited our quantitative analysis to a comparison of REG outputs for segments of emotional expression that were most prevalent and clear cut—crying with sadness, fear, or anxiety (all labeled below as anxcry), and anger. REG outputs during segments of these emotional expressions were compared to outputs during neutral talking at the beginning of the sessions, and to each other, using one-way analysis of variance (ANOVA).

Results

A. Calibration. The calibration sample totaled 979 13-minute segments over the test period. The mean number of counts per 200-sample trial over all the runs was 99.99 with a standard deviation (*SD*) of 7.06 indicating that the REG-computer setup was operating within the range expected theoretically (mean = 100, *SD* = 7.07) at a probability against chance of .40, consistent with previous calibrations at PEAR. A graph of 10,000 calibration trials (10 segments) is shown in Figure 1. The parabolic line above and below the baseline indicates displacement from the mean at the one-tailed 5% level of probability. One can see here that the REG takes a "random walk" about the baseline. Note that the graph crosses the parabolic boundary early on but quickly returns to and remains within the expected boundaries as the trials proceed.

B. Experimental. The eight patient/subjects selected for the study had a total of 39 therapy sessions during the experimental period in the spring of 1993.The number of recorded therapy sessions per subject varied considerably, ranging from one to eight. The 39 sessions yielded 76 13-minute REG segments. Of these, 33 were during periods of neutral talking, that is, talking without obvious emotion or emotional expression (neutalk on charts), 13 were during periods of anger, and 30 were during periods of crying.

The following details from a few therapy sessions will give some idea of the

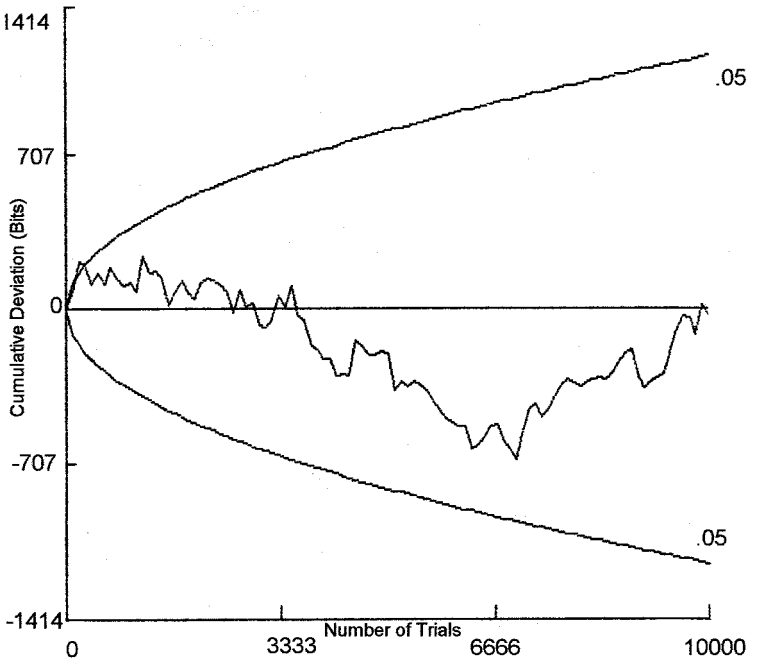

Fig. 1. Calibration.

kinds of behavior observed in therapy, the REG results, and patterns of movement in the REG output. We will begin with data from two subjects who expressed a single emotion throughout most of their sessions.

Subject 6, a woman in her thirties, had a relatively unarmored character structure and was fluid and open in her expression of emotion. During her six experimental sessions she expressed essentially two kinds of behavior, unemotional (neutral) talking, and, after a few minutes of sighing, fear with screaming and deep sobbing. Figure 2, a cumulative graph of all of her sessions, shows an accumulating downward shift in the trial counts emitted by the REG, breaking through the border of the 5% probability parabola in several places, and terminating outside the envelope.

In contrast, Subject 8, who was also relatively unarmored, spent most of her experimental sessions spontaneously raging, with loud yelling and hitting the couch. Figure 3 shows the REG output for her six test sessions. The raging of sessions 1 to 5 is associated with a cumulative rise in REG output until the sixth session when her anger gave way to crying. At this point the REG took a sudden drop.

The data in Figure 4 are from a subject (11) who expressed mixed emotions during the sessions. The cumulative graph is for a single segment of 1,000 trials. It is important to note that in the graphical representation, we are most

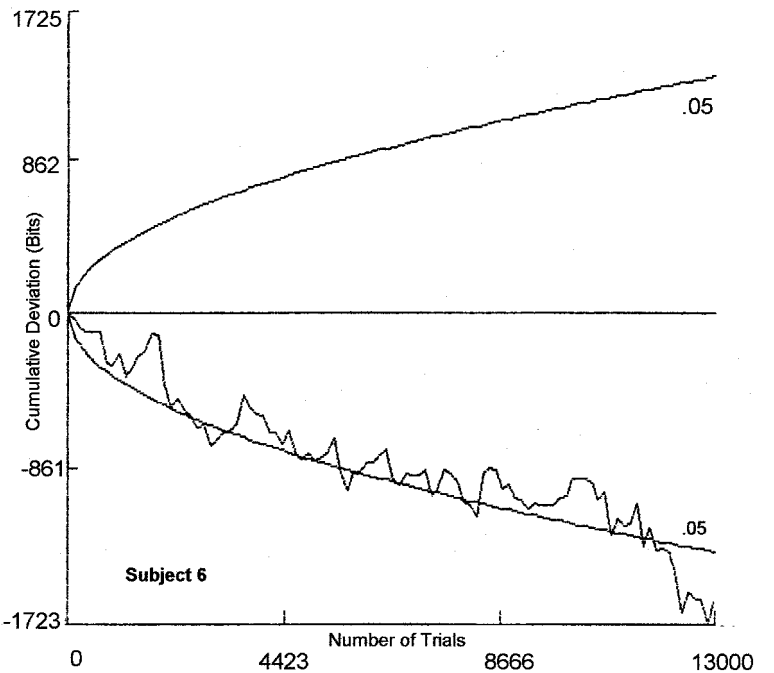

Fig. 2. REG output during anxious crying.

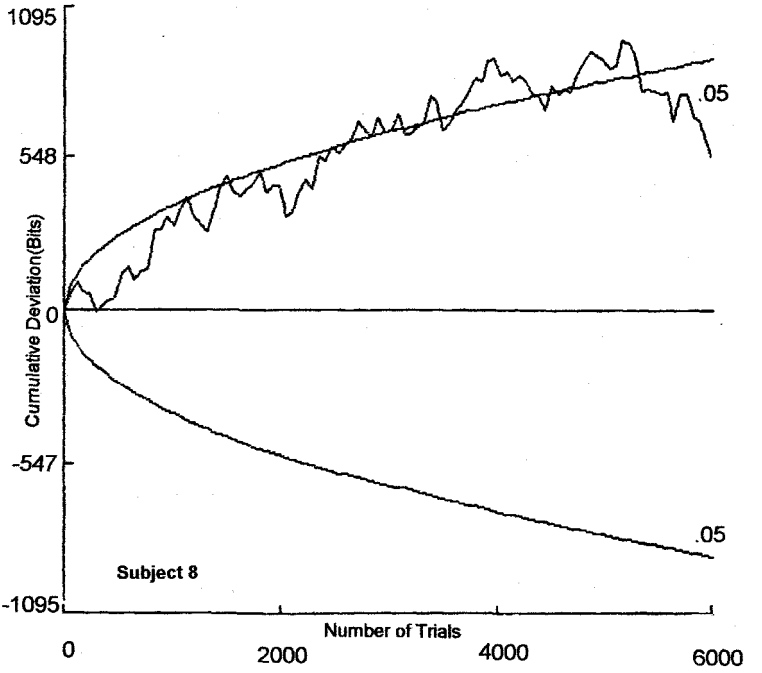

Fig. 3. REG output during anger.

concerned with sharp shifts in direction of movement, either up or down, rather than where the shift is taking place in relation to baseline. Thus a sudden shift upward, even though it begins well below the baseline, represents a greater than average number of correlation counts generated by the REG. This subject showed great lability in emotional expression throughout all her sessions. Talking or the slightest amount of sighing would often spontaneously lead to the expression of intense crying alternating with anger. The REG output correlated well with her emotional lability, with strong trends both above and below baseline at different times, although the final cumulative distribution of counts is well within chance. Figure 4 shows the first of three 13-minute segments from her session of April 25, 1993. She spent the first 8 minutes of the session talking about recent events without much emotion, then when instructed to sigh, spontaneously trembled, cried, and felt fear. When talking, the REG output was nominal, wandering above and below baseline in a typical random walk. When she began to cry, however, (at 666 trials) the REG output rapidly dropped.

All Subjects

The basic unit of analysis for quantitative assessment in this study is the 13-minute segment, which consists of 1,000 trials where each trial is scored by the

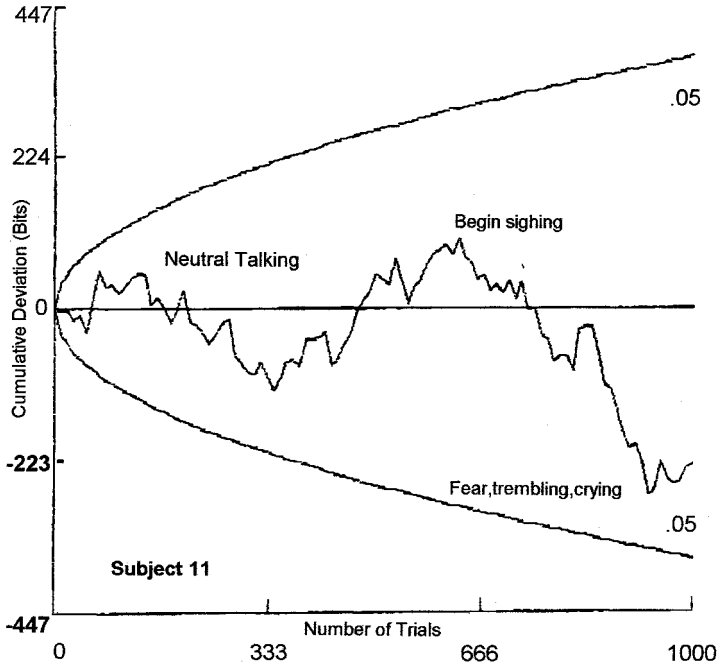

Fig. 4. REG output during anxious crying.

number of counts observed in 200 samples of the 50-50 random process. The trial counts are averaged for the 1,000 trials in the segment. For convenience, these segment means are then converted to z scores using the formula, $z = (MN - 100)/SE$, where MN is the count mean for the 1,000 trials in the segment, and SE is the standard error of the mean, computed as the SD (trial standard deviation), averaged over 1,000 trials, divided by the square root of 1,000. These z scores were used for all the analyses. Table 1 shows the average REG scores (z scores) by subject and emotional state.

The compounded data revealed in the totals show that the REG output during the expression of emotion is significantly different from that when patients are talking with neutral affect. Also, there is a significant upward shift in REG output when anger is expressed and a significant shift downward when the patient is crying.

As can be seen in the table, this pattern is consistent across all eight subjects.

Study 2

The experimental setup was similar to that used in Study 1 except for a change in locale and the use of upgraded software from PEAR. The change in locale consisted of a move of the same trailer-office to a new location, a few miles away. The office was located approximately 50 feet from my home and the closest other dwelling was at least one-quarter mile away. The upgraded

TABLE 1
ANOVA of REG Output *vs.* Emotion—Individual Subjects and Totals

Subject		Neutalk	Anxcrying	Anger	*F*-Test
4	*M*	0.458[a]	-0.306[a]		$F(1, 11) = 4.44$
	n	6	7		$p = .059$
5	*M*	0.015[ab]	-0.723[b]	1.138[a]	$F(2, 15) = 4.00$
	n	13	3	2	$p = .041$
6	*M*	0.606[a]	-0.644[b]		$F(1, 8) = 5.50$
	n	3	7		$p = .047$
7	*M*	0.398[a]	-1.096[b]	0.971[a]	$F(2, 11) = 14.54$
	n	5	6	3	$p = .0008$
8	*M*		-1.667[b]	0.813[a]	$F(1, 4) = 12.94$
	n		1	5	$p = .023$
10	*M*	0.979			
	n	2			
11	*M*	0.113[a]	-0.445[a]	0.612[a]	$F(2, 8) = 2.17$
	n	2	6	3	$p = .176$
13	*M*	0.335			
	n	2			
Total	*M*	0.291[a]	-0.658[c]	0.853[b]	$F(2, 73) = 26.97$
	n	33	30	13	$p = .0001$

Note: The *n* refers to the number of segments. *M* refers to the mean *z* score for the various conditions for each subject. Each epoch is 1,000 trials, and each trial score is the number of hits in 200 attempts of a 50–50 random process. In each row, means that share a superscript do *not* differ significantly (by Fisher's PLSD multiple comparison test, 0.05 level).

software permitted continuous generation of REG output, unconstrained by the earlier 1,000 trial limit, the use of computer function keys to mark events in real time, and much more precise statistical analysis of data segments by trials, timed to seconds, or as marked by function keys. Videotaping, therefore, was replaced by taking timed notes of events and pressing appropriate function keys to mark times of the beginning and end of periods of talking, sighing, emoting, *etc.*

REG data were obtained during the treatment of nine female patients, two of whom had been subjects in Study 1. The number of therapy sessions per patient ranged from one to 12. The same criteria for the selection of subjects used in Study 1 were used in Study 2. In the new office, the REG was within arm's reach of the therapist, on the side away from the patient. The therapist could press the computer function keys and read computer time, but the REG readout was not displayed.

Procedure

At the moment the patient entered the office, the REG was started. As the session progressed, appropriate function keys were pressed to mark the beginning and end of events of overt emotional expression. These events and the time as displayed on the computer were simultaneously noted by the therapist on a pad and by pressing a function key. The end of the session was marked by turning off the REG.

The REG data were examined only at the end of the 8-month test period, which began in January 1995. To analyze the data, notable events were first listed for each patient, then the REG record was examined for that event time period. Calibration runs were conducted during periods throughout the experiment when the office was unoccupied. A one-way ANOVA was used to analyze the data.

Results

The mean of 299,514 calibration trials was 100.012 with a SD of 7.072, well within the parameters for calibration determined by the PEAR laboratory.

The 86,789 trials produced during all patient sessions yielded 70 notable events fitting the description given in Study 1, above. Thirty events were of talking with neutral affect; 30 were of the expression of anxious, frustrated, or depressed crying; eight were of the expression of anger; and two were of the expression of longing. As in Study 1, the basic unit of analysis is the segment of REG output associated in time with each notable event. In Study 2, however, the segments consist of a varying number of trials. For each segment, a z score is computed in the same way as in Study 1, and these z scores are used for the analysis. The z scores for the segments associated with the 70 notable events are listed in Table 2.

An analysis of the data in Table 2 is seen in Table 3. It shows a summary of an overall comparison of REG output during conditions of the expression of neutral talking, anxious crying, anger, and longing using ANOVA. Significant differences are seen between all conditions [F (3,66) = 3.956, P = .012]. This was due to the anxious crying condition being significantly lower than all of the other conditions in pairwise multiple comparison analysis [by Fisher's protected least significant difference (PLSD) statistic].

We can see from Table 3 that in Study 2 there was no significant difference in REG output between periods of neutral talking and the expression of anger, but there was a significant difference between periods of neutral talking and crying and between anger and anxious crying. As in Study 1, the direction of REG output is upward with the expression of anger and downward with the expression of anxious crying. The compounded data reveal highly significant differences between all variables. Data associated with longing was not included in this analysis since it was not recorded in Study 1. Longing will, however, be discussed below.

Table 4 shows the results of a 2 × 2 ANOVA for the combined results of Studies 1 and 2, using study as the first factor (1 *vs.* 2) and condition as the second factor (neutral talking, anxious crying, anger). This analysis shows that the two studies did not differ significantly [$F(1, 138) = 0.032$, $p = .8575$]. Nor is there a significant study by condition interaction [$F(2, 138) = 0.814$, $p = .4453$]. It is therefore valid to pool the two studies for a combined analysis. Table 5 shows a comparison of the REG output for the different states of emotional expression using the pooled data from Studies 1 and 2.

TABLE 2
Data for 70 Events, Study 2

	N	Mean	*SD*	*Z*
Neutral talking				
	1061	99.909	7.208	-0.421
	263	99.989	7.211	–0.026
	1399	99.976	7.118	-0.125
	261	99.958	6.292	-0.096
	929	100.397	7.229	1.712
	1430	99.847	7.088	-0.819
	844	100.086	7.365	0.355
	1127	99.970	7.323	-0.143
	157	99.809	6.213	-0.339
	362	100.204	7.207	0.550
	686	99.917	7.245	-0.308
	416	99.849	6.718	-0.437
	210	100.590	7.183	1.210
	255	100.333	6.807	0.753
	158	99.785	8.146	-0.383
	155	98.806	6.691	-2.101
	548	99.754	7.018	-0.816
	1428	99.971	7.044	-0.153
	391	100.228	6.791	0.637
	625	100.322	7.089	1.137
	62	100.903	6.585	0.157
	252	99.770	7.418	-0.517
	795	99.966	7.047	-0.135
	619	100.278	6.950	0.978
	853	100.247	6.852	1.022
	185	100.357	6.653	0.686
	661	100.244	7.223	0.886
	507	99.807	7.092	-0.616
	843	100.001	7.165	0.005
	300	100.253	7.275	0.621
Anxious crying				
	2234	99.509	7.233	-3.279
	2263	99.885	7.106	-0.773
	422	99.652	6.922	-1.012
	1658	99.996	7.283	-0.024
	1288	99.714	7.196	-1.450
	894	100.611	7.041	2.582
	1643	99.912	6.754	-0.502
	529	99.698	7.178	-0.984
	1619	99.805	7.097	-1.107
	1681	100.168	7.219	0.976
	929	100.076	7.251	0.329
	1352	99.762	6.944	-1.250
	1715	99.802	7.070	-1.158
	1089	100.185	7.380	0.861
	1732	99.708	7.084	-1.719
	1482	100.163	7.016	0.889
	1007	100.002	7.211	0.009
	3154	100.227	7.002	1.806
	328	100.857	6.800	2.194
	1258	99.869	6.998	-0.658
	2118	99.805	6.982	-1.297
	1632	99.718	7.184	-1.610

TABLE 2 (continued)
Data for 70 Events, Study 2

	N	Mean	*SD*	*Z*
	1962	99.735	6.988	-1.660
	111	99.919	7.675	-0.121
	513	99.470	7.064	-1.698
	222	100.086	7.492	0.180
	865	99.869	7.186	0.865
	1595	99.788	7.290	-1.197
	1184	99.973	7.082	-0.132
	2283	99.862	7.046	-0.935
Anger				
	622	100.188	7.418	0.663
	863	100.136	6.979	0.563
	683	99.848	6.761	-0.563
	607	100.476	6.687	1.659
	451	100.233	6.536	0.699
	338	100.163	7.738	0.423
	162	100.488	7.144	0.878
	452	100.381	6.832	1.144
Longing				
	463	100.620	7.007	1.886
	527	100.110	7.214	0.357

This analysis shows that when all of the data are considered there are significant differences between all the studied states of emotional expression and that anxious crying is associated with a downward shift of REG output and anger is associated with an upward shift in REG output. This may be illustrated by the graph of cumulative REG output shown in Figure 5.

Discussion

Although this study was designed simply to explore the possible relationship between emotional expression and REG output and to develop working hypotheses for future experimentation, the results from both studies appear remarkably robust. The data indicate that overt emotional expression on the part

TABLE 3
Study 2—Comparison of Four Conditions, All Data

Group	Count	Mean	*SD*	*SE*
Neutral	30	0.137^{b}	0.810	0.148
Anxcry	30	-0.437^{a}	1.276	0.233
Anger	8	0.696^{b}	0.671	0.237
Longing	2	1.127^{b}	1.099	0.777

Note: The count is the number of separate segments for each condition of emotional expression. Means with different superscripts differ significantly at the 5% level. Means that share a superscript do *not* differ significantly (by Fischer's PLSD multiple comparison test, 0.05 level).

TABLE 4
ANOVA, Combined Results of Studies 1 and 2

Source	DF	Sum Sq.	Mean Sq.	*F* test	*P*
Study (A)	1	0.024	0.024	0.032	0.8575
Condition (B)	2	32.626	16.313	21.750	0.0001
AB	2	1.221	0.610	0.814	0.4453
Error	138	103.506	0.750		

of female patients correlates significantly with shifts in the distribution of trial scores generated by an electronic random event generator.

Furthermore, we find a highly significant correlation between the direction of the shift and the kind of emotion expressed: Periods where the patient was crying with fear, anxiety, frustration, or sadness were associated with a marked downward shift in REG output, whereas periods where the patient was expressing anger were associated with a marked upward shift.

In attempting to understand the basis for this phenomenon, we are faced with several serious problems, the first of which is that there is no satisfactory understanding in traditional mechanistic biophysical terms of what an emotion

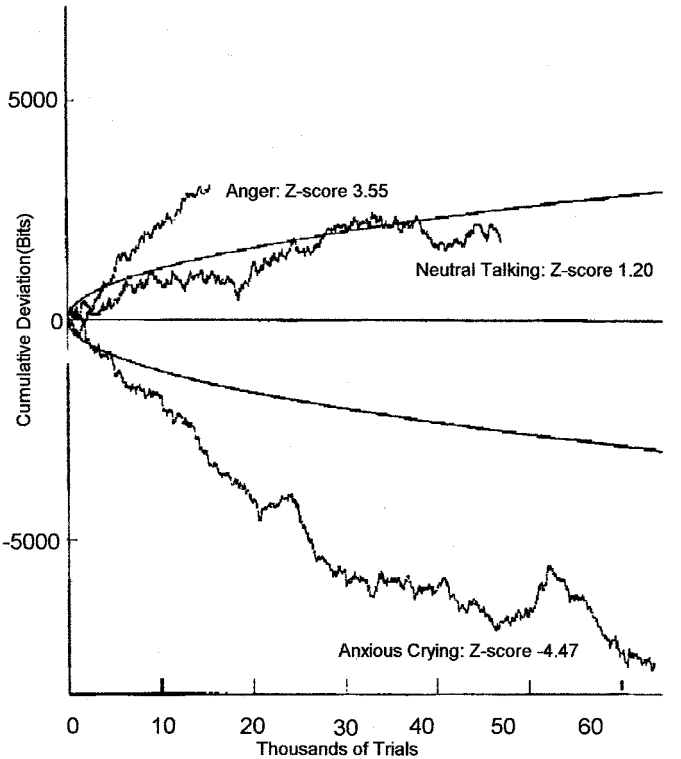

Fig. 5. Combined cumulative deviation of REG output.

TABLE 5
Comparison of Conditions, Studies 1 and 2 Pooled

Group	Count	Mean	*SD*	*SE*
Neutral talking	63	0.218[a]	0.722	0.091
Anxious crying	60	-0.547[b]	1.039	0.134
Anger	21	0.793[c]	0.658	0.144

Note: The count is the number of separate segments included. Means with different superscripts differ significantly at the 5% level. Means that share a superscript do *not* differ significantly (by Fischer's PLSD multiple comparison test, 0.05 level)

is, any more than there is an understanding of what the mind is. Second, even if we understood the biophysical basis of emotions in traditionally accepted terms, *i.e.,* as originating and functioning strictly within the physical body, there is no known basis for understanding how emotions could influence a random event generator either locally or at a distance.

A tentative, but incomplete, functional explanation is suggested, however, by combining Jahn and Dunne's concept of resonance in man–machine interactions and Reich's concept of bioenergetic pulsation in emotional expression. Jahn and Dunne (1987) hypothesize that consciousness operates primarily on a wave-mechanical basis and that the degree of resonance between the operator and the device is a function of the degree of superposition of the wavelike properties of the two. When resonance is established, they state, "molecular experiential patterns can arise whose observable characteristics differ significantly from the simple sum of their individual behaviors." At this point we must assume that human–machine resonance as Jahn and Dunne have defined it can be established whether or not there is conscious intention of the subject (operator, patient) toward the machine. Their field REG studies, cited above, indicate that this is possible.

As noted earlier, Reich proposed that anxiety and pleasure are antithetical functions with respect to the phenomenon of total organismic pulsation. For several reasons, Reich found that bioelectricity *per se* could not satisfactorily account for all the phenomena seen in his experiments (Reich, 1948). His proposition of a vital, nonelectromagnetic, bioenergetic force called orgone energy did, however, satisfy the necessary requisites for understanding the phenomena, and he recast his formulations in its terms. According to Reich, states of anxiety or depression were functionally identical to a contractive movement of orgone energy toward the core, pleasure as an expansion of energetic excitation toward the skin surface, and anger as expansion toward the skin surface, but stopping at the musculature.

The results of the present studies indicate that, with respect to direction of REG output, anger and anxiety/sadness are antithetical emotional expressions. We have found that the emotions described by Reich as expansive significantly correlate with an upward shift in REG movement, corresponding to a positive or constructive correspondence to the binary output with the regularly alternating template sequence. Those described as contractive are correlated

with a downward shift in output or a destructive correspondence with the template. Both indicate increased order in the nominally random process. This finding is supported by an analysis of the REG output when patients were longing, an expansive emotion according to Reich. We found that longing, despite the fact that its expression in the study involved crying, was in all instances correlated with marked, highly anomalous *upward* shifts in REG output. Although there were only two events where longing was expressed (Study 2), their average *z* score was 1.27 (*SD* of 1.099). Establishing that the expressed emotions correspond to direction of REG response and that this fits Reich's hypotheses with respect to bioenergetic movement *within* the physical boundaries of the organism does not, however, explain the nonlocal effect on the REG. And, assuming that many of the same forces are operative in emotional expression and conscious intentionality, we cannot easily invoke electromagnetism as an explanatory mechanism since Jahn and Dunne found similar results in their local and nonlocal experiments, as well as in experiments performed atemporally (Jahn and Dunne, 1987).

The issue is further complicated by the fact that directionality in REG output with the device used in this experiment is completely arbitrary: Once the original signal is electronically rectified, upward and downward shifts of the REG output do *not* mean that they are generated by physically greater or fewer noise source pulses. So, as much as one might be tempted to hypothesize some expansive physical force being emitted during, say, the expression of anger, which then secondarily causes an increased generation of electrical impulses in the REG, such a causal mechanism would be impossible given the lack of linkage between the original generation of electronic signals by the REG and the final direction of its output.

The fact remains that we simply do not know enough at this time to satisfactorily explain these phenomena. We can, however, explore the following hypothesis for future experimentation.

First we must answer the oft-asked question of the role of the experimenter in determining the outcome of the experiment. On beginning the first study, I was aware that I brought to it certain assumptions and intentions. These were my known beliefs related to the subject prior to beginning Study 1:

1. Conscious intention and passive participation in an experimental setup could effect anomalous changes in the output of machines.
2. Information could be anomalously transmitted from one person to another independent of time and distance.
3. Life processes, including the generation and expression of emotions, were not the result of a highly sophisticated mechanical concatenation of dead parts, but rather the expression of a spontaneously pulsatile life energy functioning within a membrane.
4. This same energy functioned at large, external to living systems, where it provided a medium from which electromagnetic impulses could emerge and through which they were transported. To my mind it

was possible, though definitely unproven, that it also served as the medium for the transmission of psychokinetic impulses, telepathic information, and other anomalous manifestations of consciousness.

5. If conscious intention and passive attention could anomalously affect an REG, so might spontaneous emotional expression. There was no *conscious* belief that opposite directions of REG output would be found to correlate with certain kinds of emotions, although I was certainly *preconsciously* aware of Reich's findings, noted above. (By preconscious I mean information that is accessible to conscious awareness, although not necessarily conscious at the time.)
6. At the beginning of Study 2, I was consciously aware of the bidirectionality of REG performance in correlation with emotional expression.

I believe that my knowledge and biases prior to undertaking the investigation may have been a significant factor in obtaining our results. *My current working hypothesis is that the investigator, patient, and REG cofunction in a state of resonance and that the REG output is a manifestation of the functional unity of the triad.*

REG anomalies in group situations, where members of the group exerted no conscious intention toward the device, were seen in PEAR studies reported by Nelson *et al.* (1996; 1998) and also independently by Radin, Rebman, and Cross (1996), Schwartz *et al.* (1997), and Rowe (1998). In their discussions of the possible cause/source of the observed anomalies, Nelson, Radin, and Schwartz postulate that the interacting participants of the group may generate a consciousness field "to which the REG responds via an anomalous decrease in the entropy of its nominally random output." (Nelson *et al.,* 1996). Noting that the results of their (PEAR) benchmark REG and remote viewing experiments indicated a lack of dependence of the effects on time and distance, and assuming that the anomalous effects found in the group REG studies derive from the same basic phenomenon as the laboratory experiment, Nelson *et al.* conclude that "no conceptual models based on currently known physical fields with their usual $1/r^2$ dependencies and very limited advanced and retarded signal capabilities are likely to suffice." They go on to suggest that in view of these facts and the further finding that, "the basic effects are analytically tantamount to small changes in the elemental binary probabilities underlying the otherwise random distributions," that the "anomalies may be more informational than dynamical in their physical character." [3]

[3]de Quincey states that such concepts as quantum field potentials and field consciousness "have far more to do with the nature of time and probabilities than with space. So-called quantum fields are not actually fields in any spatial sense. They are abstract mathematical descriptions of matrices of probabilities (of tendencies for certain events to occur). It is only the *representations* of such probabilities that take on the characteristics of fields. Probabilistic events, as tendencies of events to occur, are temporal—perhaps even psychological. In the end, statements of probability are statements about psychological expectations" (de Quincey, 1999).

Our emotREG studies continue with female subjects, and we now have a sufficient number of men participating in the investigation to warrant a statistical analysis of the data at this time. Early results indicate the same kind of trends with men that were seen in our studies with women. In order to unravel possible dynamic factors in obtaining the results seen in our studies, it would be informative to have a therapist with a different theoretical bias than mine but using similar therapeutic emotion-releasing techniques (such as Alexander Lowen's bioenergetic analysis or primal therapy) repeat the experiment.

Conclusion

Our results demonstrate that the release of intense emotions in a therapeutic situation is correlated with the anomalous output of a proximate random event generator. Given the theoretical bias of the therapist-investigator, it is quite possible that his consciousness, possibly cofunctioning with that of the patients and the REG, may have influenced the REG output. Classical physical theory is unable to explain these effects, but the concepts of resonance (Jahn and Dunne) and the functional-antithetical nature of emotion (Reich) help orient us in this uncharted territory. It is suggested that the concept of a field of consciousness be entertained as a working hypothesis to be tested by further experimentation.

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