Statistical analysis is one method of finding the needles of scientifically significant evidence in the haystack of seemingly unrelated events. In this article, the author provides a look into how random events are affected by consciousness. Some of the technical terms may be foreign to you. Here is a short glossary for tourists:

empirical — derived from experience or experiment. The opposite of theoretical.

mean — the expected value of a series of chance random events such as coin flips. Also, a mathematical average.

standard deviation — an average deviation or "distance" from the mean. In other words, an average amount above or below the mean.

histogram — a bar chart in which the widths of the bars are the same and the heights show the number of times the measured value was recorded.

z-score — the deviation that a particular measurement is away from the expected value. In other words, how far above or below the mean a particular measurement is.

chi-square — the overall distribution of deviations of the measurements away from the mean.

If that sounded too technical for you, simply skip over the "How It Works" section of the article and jump to the last paragraph.

The Global Consciousness Project

By Roger Nelson

"The accumulated research shows a tiny but highly significant correlation indicating that consciousness can weakly but measurably affect the physical world.

Good research over a period of several decades has given a scientific expression to our experience of subtle interconnections, and it clearly shows that the human mind is not isolated within the body.

There is solid empirical evidence that we do interact directly with each other and the world in the domain of consciousness, despite physical barriers and separations (1). Repeated experiments show an effect on our instruments, not only of individual intentions, but also of group consciousness (2,3).

In laboratory experiments, people sit near a device that produces random numbers, but they have no physical connection to it. They try to "commune" or "resonate" with the machine (called a random event generator or REG) while wishing it to change its behavior to produce higher or lower scores than it should by chance.

The accumulated research shows a tiny but highly significant correlation indicating that consciousness can weakly but measurably affect the physical world. What seems to happen is that the "noisiness" of the random sequence is changed very slightly. The amount of information or structure in the recorded data is increased and entropy or disorder is reduced. This may happen because the situation is relevant to our consciousness, which contains and expresses the necessary information and somehow impresses it on the environment. We apparently create a tiny bit of order in the world around us, simply by ourselves embodying structured information.

GCP and the September 11 Attack On America

By Roger Nelson

The GCP EGG network reacted in a powerful and evocative way to the events of September 11. While there certainly are alternative potential explanations, this is not a mistake or a misreading. It can be interpreted as a clear, if indirect, confirmation of the hypothesis that the eggs' behavior is affected by global events and our reactions to them.

Before discussing the data and interpretations, I want to acknowledge that I like the notion of global consciousness, but that this idea is really an aesthetic speculation. I don't think we have real grounds to claim that the statistics and graphs representing the data *prove* the existence of a global consciousness.

The best we can do is to report the data honestly and completely, because we do not have a theoretical understanding of the sort that must underlie robust interpretations. For this reason, it is important to identify any explanations we give as speculative and provisional, but having said that, I would like to describe a picture that appeals especially to my aesthetic self, to my right brain.

One way to think of the correlations in the GCP data, including the extraordinary effects on September 11, is to accept the possibility that the instruments have captured the reaction of a global consciousness beginning to form. The network was built to do just that: to see whether we could gather evidence of a communal, shared mind in which we are participants even if we don't know it.

Groups of people, including the group that is the whole world, have a place in consciousness space, and under special circumstances they — or we — become a new presence. Based on evidence that both individuals and groups manifest something we can tentatively call a consciousness field, we hypothesized that there could be a global consciousness capable of the same thing. Pursuing the speculation, it would seem that the new, integrated mind is just beginning to be active, paying attention only to events that inspire strong coherence of attention and feeling.

Perhaps the best image is of an infant slowly developing awareness, but already capable of strong emotions in response to the comfort of cuddling or to the discomfort of pain.

More important than any scientific question, however, is the question of meaning. What shall we learn, and what should we do in the face of compelling evidence that there may be such a thing as global consciousness? In fact this is not a new question. The results from this scientific study are an apparent manifestation of the ancient idea that we are all interconnected, and that what we think and feel has effects on others, everywhere in the world. The implication of the GCP/EGG data reflecting our shock and dismay is in some sense quite obvious. It says that even insensate electronic random generators can see the effects of hatred born of pain and despair. It means that the earth cannot support us in comfort as things now are. It urges a new understanding that we must learn to accept each other and help and support each other, everywhere in the world, if we are to live in peace on this beautiful earth.

Further Information:
http://noosphere.princeton.edu/terror.html

Odds, Terrorist Attacks, Sept 11, 2001
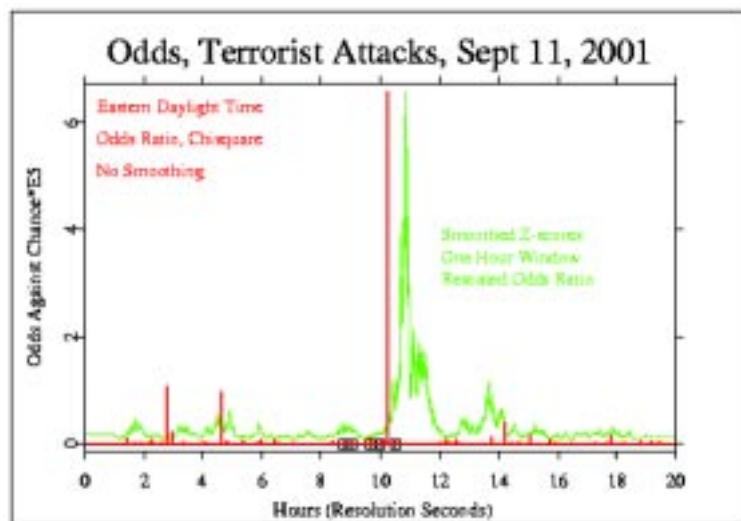
The figure shows the raw odds against chance, second-by-second, for the squared Stouffer Z-scores (chi-squares) for September 11. The maximum odds ratio, shown as a spike in the center of the graph, is equivalent to a Z-score of 4.81, and occurs at 10:12:47, EDT, not long after the first World Trade Center tower collapsed. A Z-score this large would appear by chance only once in about a million seconds (roughly two weeks). Thus it is not terribly unusual to find such a spike in our large database, but it is thought-provoking that one does occur within the brief time-span of the attacks, about an hour and 45 minutes. The ratio of this period to the mean time between spikes of this magnitude is 1/192, so the odds of this being just a chance occurrence is nearly 200 to 1. To see more clearly the contributions to the chi-square deviations, the figure includes a display of the odds ratios calculated for the same data, but with the Stouffer Z-scores passed through a 1-hour smoothing window. This graph emphasizes and enlarges selected details.

(Continued from page 6)

CONSCIOUSNESS FIELD

How do we jump from the lab results to "global consciousness?" Why should there be any effect of a world-wide New Years celebration, or a billion people watching a funeral ceremony, or the beginning of a war, on such REG devices located around the world?

Although it must be recognized as a metaphor, it may be helpful to envision a "consciousness field." Picture a faint radiance of information extending out indefinitely from each mind, with a wave-like interpenetration creating tenuous interference patterns that differ depending on our intentions and our degree of engagement. Again, we are speaking of a metaphor, not an actual physical energy that we can directly measure, but something like a consciousness field carrying information, which may be responsible for the anomalous effects in "field" studies with REGs.

Small-scale experiments have shown consistent deviations of the data from randomness in situations where groups become closely integrated or focused on a compelling mutual interest. During deeply engaging meetings, concerts, rituals, etc., the data tend to have slightly increased order compared with the expected randomness, and we are able to predict this deviation, according to the type of gathering, with significant success (4,5).

In the Global Consciousness Project (GCP), exactly the same procedure is applied on a broader scale. Friends and colleagues around the world form a network of people with interest in the GCP who are willing to set up a computer to host an "egg" — one of our REG-based detectors. We predict a detectable ordering in otherwise random data recorded from this network during world-scale events that are likely to engage the attention of large numbers of people around the globe. The prediction is made before the event if possible, and prior to analysis of the data in any case. Looking for slight shifts in the variability of the outcome tests the prediction. The statistics for the continuous data streams registered by the EGG network have well-defined expectations based on theory and calibrations. We simply compare the empirical data with this background to see whether our hypothesis is supported.

SUBTLE SCIENCE

The questions we are asking are far from the mainstream, so our egg hosts are unusual people, willing to try things off the beaten path. And our methods are not exactly from a cookbook, though they are well-honed tools drawn from relevant scientific and engineering disciplines.

We set out from the beginning to have a balance of science and art in the EGG project. The aesthetic motive keeps our broader purposes in mind, by posing the philosophically intriguing questions that are worth serious effort, while the scientific aspect has a special role to play in providing useful, reliable answers.

The science has to be done right, so we have given lots of attention to certain details that are in the background, but are essential if we are to learn something — and avoid fooling ourselves. We know, for example, that the appearance of an effect is partly determined by how we look for it, so that the exact specification of the method has to be established prior to its application and before we have any knowledge of the results. As George deBeaumont, who has done many of the formal analyses, puts it, "It is a subtle beast we are chasing."

HOW IT WORKS

Because they are esoteric, it is a little difficult to envision the actual measures and equipment that are at the core of the EGG (electrogaiagraph) project. The basic instrument is a random event generator, or REG, which is an uncommon device, although all of us are directly familiar with various random processes in the world, including such things as flipping coins or watching unpredictable cloud formations. For computer-based data collection, we use REG devices that are an electronic equivalent of high speed coin-flippers (6). They work with measurements of "white noise" like the random static between radio stations.

The voltage level of this noise, which ranges unpredictably above and below an average level, is turned into 1's and 0's which we can count as if they were heads and tails. Such electronic random sources produce a steady stream of unpredictable binary events, or bits. For the EGG data, we record a "trial" from each REG device in the network, once every second. The trial consists of 200 bits and its value is recorded by counting the 1's. We expect that this count will be about 100 because there is a 50/50 chance for a bit to be 1 or 0. Figure 1 shows the noisy trace of a sequence of actual trials from one REG device.
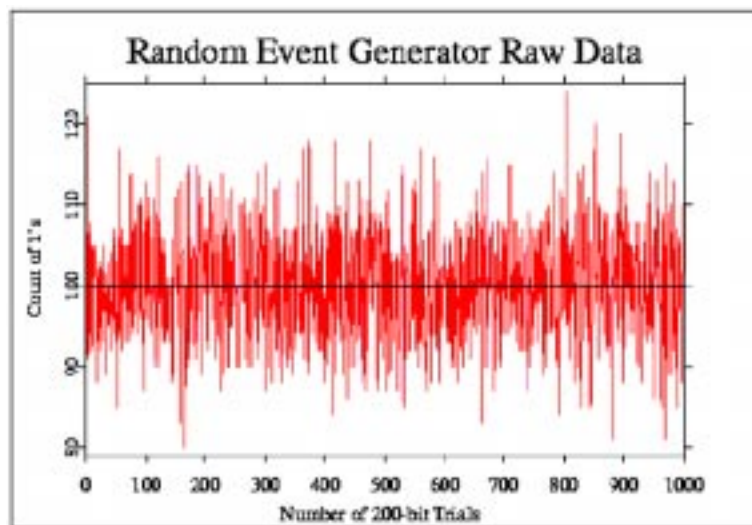

Figure 1: 1000 trials from an electronic REG. The horizontal line at 100 is the expected mean for the 200-bit trials, and the expected standard deviation is 7.071.

The result for each trial at each egg is, in fact, a varying quantity which depends on chance fluctuations, but over a large number of such trials we see a close approximation to the normal distribution, or bell curve. Most of the values are near 100, tapering

off to rare scores as far from the mean as 70 or 130.

The next figure (Figure 2) shows how closely matched the empirical and theoretical scores are, even in a sample of modest size compared with the large number of trials that enter into most of our analyses.
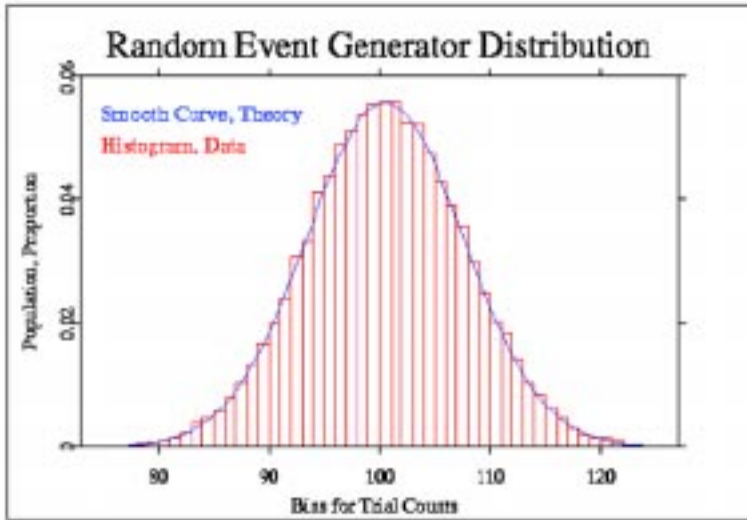

Figure 2: Histogram of raw scores, for 200-bit trials. The smooth curve is the theoretical normal expectation, approximated by the binomial distribution.

One of the best ways to visualize trends in the data is to graph the deviations of the average of the trial values from what is expected, and to display the accumulated total of the deviations. This produces a "random walk" like that shown in Figure 3, which wanders above and below the expected deviation of zero, but in normal calibration data shows no persistent trend (7). The figure plots the accumulation of differences of a normalized version of the mean trial score, calculated across all the eggs for each second. This "Z-score" is squared to become a "chi-square" quantity, which has a well-known statistical distribution. The squaring also eliminates any distinction of positive and negative raw scores, and represents our hypothesis that there will be consistent departures from expectation without regard for the direction.
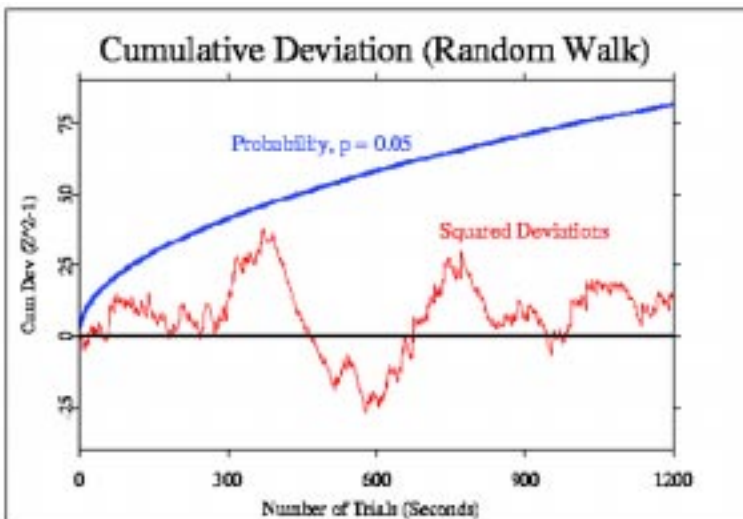

Figure 3: Trial scores are normalized (as Z-scores), then squared (yielding chi-square-distributed values), and plotted as a cumulative deviation from their expectation. The resulting random walk is compared with a smooth curve which shows the 5% significance criterion.

Consistent departures from the expected mean value are easy to see because their cumulative deviation will have a slope or trend superimposed on the random walk. Even a tiny effect will eventually yield a significant departure, with a low probability that it is a chance result. Thus, to see whether there is a correlation of the data with global events, we examine the scale and the consistency of the trial score variations.

We believe this measure may reflect our hypothesis that certain states of consciousness can affect the REG devices. In particular, we take departures from the normal, expected behavior as a measure of some manifestation of "consciousness."

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This is the second in a series of articles about the Global Consciousness Project. The first article appeared in the May 2002 issue of The Golden Thread. Roger Nelson is Director of the Global Consciousness Project, a voluntary and independent international research program. The GCP is a voluntary collaborative effort between scientists and interested people worldwide. It is not funded by the institutions at which its organizers and directors are employed, nor should its research data be cited as "proof" of global consciousness — although it may be seen as "evidence" for a hypothesis that may be yielding to scientific analysis. The main repository for documentation and the primary communication interface for the project is a deep and comprehensive Web site at http://noosphere.princeton.edu.

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