ANOMALOUS STRUCTURE IN GCP DATA: A FOCUS ON NEW YEARS

Roger D. Nelson
Global Consciousness Project, Princeton, New Jersey, USA

ABSTRACT

Continuous parallel sequences of random data have been accumulated in the Global Consciousness Project (GCP) for six years as of August 2004, and we have made one or more formal predictions regarding potential structure in the data associated with each New Year transition during that time. The network has grown to about 60 active REG devices around the world, each reporting data generated as 200-bit trials at one per second over months and years. We make two types of prediction for New Years, one that the mean trial score of the network will depart from expectation, and another that the variance across devices will be reduced near midnight. The GCP data are signal averaged across all time zones, and the period surrounding midnight is assessed. This paper details the formal analyses as well as a number of explorations that sharpen the statistical focus. The analyses for individual years show results conforming to the pre-specified hypotheses in about two thirds of the cases. When all six years are combined, the meanshift prediction is marginally supported with a p-value of 0.053. The variance prediction is more strongly supported, with a p-value of 0.022 for the four years when this was an *a priori* prediction (0.007 for all six years). The joint probability for the two measures is less than 0.001. The original analysis for the variance reduction was based on the “shape” of the data curve around midnight, formalized as a combination of the magnitude of the peak reduction and its proximity to the transition point. A simple calculation of the variance reduction in the 10 minutes around midnight yields a weaker result, supporting the indications of an increasing effect with stronger focus on that point in time. While it is prudent to keep alternative explanations in mind, these results are *prima facie* evidence of a large-scale interaction of human consciousness that can have effects in the physical world, similar to those found in intention-based laboratory mind-machine experiments.

INTRODUCTION

The Global Consciousness Project (GCP) was created to assess possible correlations between special events in the world and measures of structure in random data (Nelson, 2001). The plan was to make a network of random event generators (REG) placed around the world, and record data from them continuously, creating a database comprising a continuous swath of random numbers in synchronized parallel sequences. Given this unrolling tapestry of unpredictable, but labile measures, we proposed to test the general hypothesis that the data would show structure or patterns at times when major events drew attention and focus from large numbers of people. A good analogy is looking for patterns in multi-channel electroencephalograph (EEG) data associated with specific sensory stimuli, though of course we would not be recording electrical signals. The structural semblance actually led us to the image of an "ElectroGaiaGram," a kind of EEG for the world, and we called the growing collaboration the “EGG project”. Though it is more formally known as the GCP, we continue to use terms derived from the EGG metaphor.

Before we started collecting data in the newly established network in August 1998, we thought about what kinds of events bring people together in a widespread, shared focus of thought and emotion. One of the first obvious candidates was the celebration on New Years Eve. The transition from the old to the new is a focus point all around the world. True, there are important "New Year" celebrations on different dates, the Chinese New Year, the Persian New Year, and ceremonies welcoming Spring, but the main one is December 31 going into January 1st. Even in parts of the world where there is another cultural New Year, there is a good deal of attention paid to the midnight transition celebrated in New York's Times Square, in London, in Hong Kong, in Perth, in Hawaii – practically everywhere there are people. It is a natural because of the calendar, and because it has momentum and is a grand party the world over.

In any case, as midnight approaches on New Years Eve, an unusually large proportion of humanity merges in a common engagement. Individualized interests and expectations are put on hold, replaced by a kind of synchronized dance of participation. The same kind of widespread engagement may also develop when a terrible event occurs, especially if it is an unexpected, surprising, awful thing such as the terrorist attacks on September 11 2001 (Nelson, 2002; Nelson, et al. 2002; Radin, 2002). New Years isn't like that, of course. On the contrary, it is anticipated, prepared for, even traditional. It is almost like the rituals of religious practice, though simpler and easier to share: just focused attention to a moment with no intrinsic importance or any deep meaning to distract us; an unusually relaxed, shared moment in time.

Given all that, New Years is an ideal opportunity to consider collective consciousness in a relatively clear, pure form. No worries or agitation, no danger, no regrets. Brief and precisely focused, the moment draws attention that is lightly and willingly given, and because there are few competing distractions, our momentary immersion in the abstraction of time is an unusually potent shared moment. Afterward we go back to the ordinary world, separating from each other and from the collaborative moment. This defines in operational terms what we call a "global event" which constitutes or produces a special state of consciousness that may register as correlated structure in the output of random event generators. The general hypothesis of the GCP is that we may find changes in the swath of REG data associated with such moments in time. That is, we hypothesize that an unusual state of relatively coherent, shared consciousness will produce a correlated signal in the GCP data.

METHODS

How the hypothesis is tested

What does it look like if we attempt to capture a signal in the sea of informational noise our minds create in the world? If we really do share emotions and thoughts, we might expect our common focus to produce a corresponding focus in a hypothesized "field of consciousness" covering the earth with a sparkling, scattered layer of thought and feeling. Though they are normally random or unstructured relative to each other, our mental processes may sometimes resonate and become synchronized. Think of those mental sparkles as notes in all registers and rhythms, uncoordinated most of the time because there is no score or conductor. But when there is something special, a shock or surprise, a ritual or a celebration, then we might expect the sparkling to develop ripples and waves that put some structure into the chaos. Thinking in terms of sound, we can imagine the random tunings of an orchestra changing to music at the rap of the conductor's baton. To see whether there is an effect of focused consciousness on our data, we take the midnight transition to the New Year as a stimulus that may create a coherent signal in an otherwise noisy background.

We do two analyses on the data for each New Year to identify structure, and we now have six years to examine. The basic notion is that as the New Year moment goes from time zone to time zone around the world, there will be subtle but detectable changes in the EGG data. To visualize this we make a composite, averaging the period surrounding midnight across all time zones. The predefined period of interest is narrowly focused on midnight ± 5 minutes, although the variance graphs below include a half hour of context around the transition. The choice of 10 minutes for the formal analysis is arbitrary, but is intended to capture the increasing focus of celebrants' attention near midnight.

We use the standard signal processing tactic called epoch or signal averaging to reveal any faint patterns or structure associated with the special moment of celebration around the world as the old year ends and the new begins. Signal averaging is a technique commonly employed in the measurement of weak but repetitive signals. Successive data records from such a signal with a well-defined trigger source (the stroke of midnight in this case) are summed to calculate one averaged signal. The technique exploits the fact that the desired signal is coherently summed, while any source of noise that is incoherent with respect to the trigger signal will diminish in amplitude with successive averaging operations. Signal averaging can be used to reveal signals that are buried in the background noise and to increase signal-to-noise ratios from below unity to more acceptable levels (Applications Weekly, 1998). An averaged data record, $y^{AVG}[i]$, is derived from *navgs* separate data records, $y^j[i]$, in the following manner:

$$y^{AVG}[i] = \frac{1}{navgs} \sum_{j=1}^{navgs} y^j[i] \qquad 0 \le i < npts$$

Since it is applied to all averaged points, division by *navgs* is immaterial and does not change the shape of the averaged signal. Consequently, this operation is typically ignored. Figure 1 shows a simplified example, displaying the original traces from several time zones together with their signal average. The data are variance measures across REG devices, smoothed to capture trends visually. This is a selected set of ten populated zones chosen to demonstrate the clarifying effect of signal averaging.

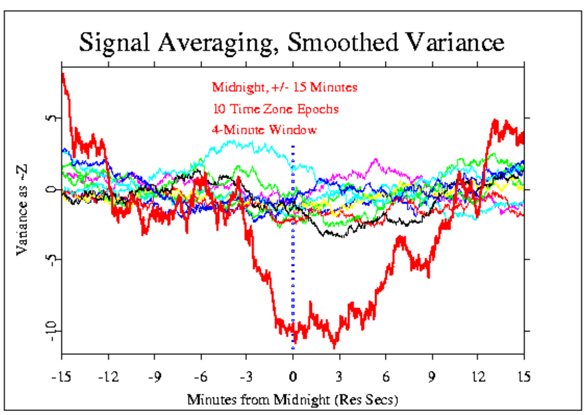


Fig 1 The heavy trace represents the signal average (sum) of ten 30-minute epochs centered on midnight, Dec 31, 1998 to Jan 1 1999. Each of the lighter traces is from one time zone, e.g., GMT or PST, selected to be one where the New Year is celebrated by large numbers of people.

The Meanshift

The first of our two pre-specified analyses for New Years looks at slight changes in the average score across eggs for each second. We calculate a *Z*-score for each egg, giving a normalized deviation from the expected score of 100. We then make a Stouffer Z, summing algebraically across all the eggs, resulting in a composite *Z*-score for each second in the 10-minute period of the hypothesis test. Next, the Stouffer *Z*-scores are squared to give a Chisquare distributed quantity, and we plot the cumulative deviation of the Chisquare from its expected value.

This complicated process is designed to represent any tendency for the eggs to show correlated deviations. It is responsive to unusually large and unusually small scores, as well as consistency of behavior among the eggs. We are looking for patterns of departure from random expectation, in the form of correlated large excursions. The graphs below show for each New Year the accumulating history of deviations over the 10-minute period around midnight, signal averaged across time zones. The terminal value in each case corresponds to the test of significance. For historical reasons, based on the PEAR FieldREG experiments, (Nelson, et al., 1996) our formal prediction is for a positive deviation, although it is arguable that a two-tailed prediction would be appropriate.

The Variance

In the second analysis we picture the result by calculating the sample variance among the eggs for each second, and extracting the sequence of these sample variance measures for the hour surrounding midnight in each time zone. We then make a composite by signal averaging the resulting segments across all time zones, finally normalizing the data as approximate *Z*-scores. This gives an hour-long sequence of 3600 points, centered on midnight, representing all the eggs and all time zones around the world (there are 37 zones, including those with half-hour offsets).

The variance measures in this sequence are too noisy to reveal any structure, but when smoothed by a moving average, momentary tendencies and persisting trends can be seen. We use a 4-minute averaging window, so each point in the final plot is the average of 240 seconds centered on that point. The graphical displays below use only the central half hour surrounding midnight, which simplifies the picture by excluding overlaps with the half-hour offset zones.

Robust statistics

Computing a valid statistic for the meanshift analysis (left panel in the figures below) is simple: the terminal value of the cumulative deviation of the Z^2 during the 10-minute period is compared with the appropriate Chisquare distribution, yielding a probability against chance.

The variance analysis is more complicated because the pre-specified hypothesis looks for both a deviation and a location, and it addresses smoothed rather than raw data. The following figures (right panel) show the smoothed variance data for the New Year transition at midnight, ± 15 minutes. We use a random permutation analysis to find out how unusual the apparent structure in the data may be. We count the number of times a minimum of greater magnitude (depth) appears in 10,000 iterations, and ask how many times the random permutations show a minimum point closer to midnight. The combination of the these measures of magnitude and proximity gives an estimate of how likely it is that the apparent structure in the data is just a chance fluctuation. However, this is a joint probability, and it cannot be directly compared or combined with single-value probabilities.

To obtain an appropriate, comparable probability, we combine the two measurables into a single measure, and use permutation analysis to determine the probability of that measure against its null-hypothesis distribution. To test the hypothesis that there will be a reduction in variance and that it will occur near midnight, a logical candidate for a combined measure is $VT = a*Vmin + b*dT$, where *Vmin* is the variance at minimum, *dT* is the absolute time interval from midnight, and *a* and *b* are pragmatically chosen coefficients to give both measures roughly equal weight, that is, to have their respective variations contributing about equally to the variability of *VT*. Alternatively, we can use a multiplication rather than a sum of the two aspects. It turns out that the two approaches give similar results with suitably chosen coefficients. Either method allows us to establish the distribution of *VT* over a large number of data permutations. The probability of the original *VT* can then be calculated relative to this distribution. The result is one measurable, one distribution, and no meta-analytical problems.

In our application, $VT = a*Vmin + b*dT$ becomes $VT[i] = abs(100*V[i])+abs(1000/T[i])$ in each permutation, to compare with the original data value $VT[0] = abs(100*V[0])+abs(1000/T[0])$, which is expected to be large if the minimum is deep and close to midnight. The multiplicative version is similar, with $VxT[0] = abs(100*V[0])*abs(100/T[0])$. This result is shown in parentheses below, symbolized as *VxT*. The full hour surrounding midnight was used for these calculations, but a comparison made using only the central half hour, midnight ± 15 mins, gives very similar results.

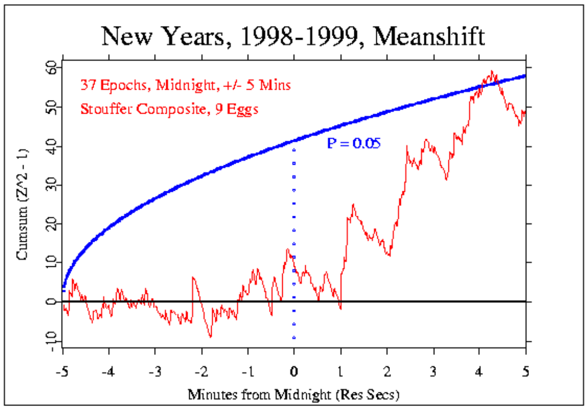
It is also possible to test the hypothesis of reduced variance around midnight with a simple calculation of the difference from expectation in a defined period. This is a *post facto* treatment, in contrast to the pre-specified shape analysis, but the procedure and parameters were set without knowledge of the results. This calculation is also given in the results section, and it compares the 10 minutes around midnight against empirical expectation. An interesting question is whether this procedure will give equivalent results to the more complicated test based on the shape of the trends in the data.

RESULTS

The following figures show the "meanshift" analysis on the left and the "variance" analysis on the right. The former tests the prediction that the eggs will tend to produce relatively large and correlated deviations during the 10-minute period centered on midnight. The latter tests our prediction that as midnight approaches, the variability of the data across the eggs will decrease, reaching a minimum near midnight, then return to normal. The two measures are almost completely independent even though they are based on the same raw data.

1998-1999

The meanshift measure conformed well to the *a priori* prediction of a positive trend during the 10 minutes surrounding midnight, with a total deviation corresponding to a probability of 0.085. In the variance measure (which is a *post facto* analysis for this year) the deepest minimum reached by the smoothed variance was exceeded almost half the time ($p = 0.447$), but it was closer to midnight in all but 15% of the random permutations ($p = 0.147$). The combination of magnitude and proximity yields a joint probability of $p = 0.066$. The rigorous *VT* statistic for 1998-1999 gives a similar probability of 0.0647 (0.063 for *VxT*). The simple measure of the reduction at midnight ± 5 min yields a somewhat less impressive result with $Z = -1.158$ ($p = 0.123$).



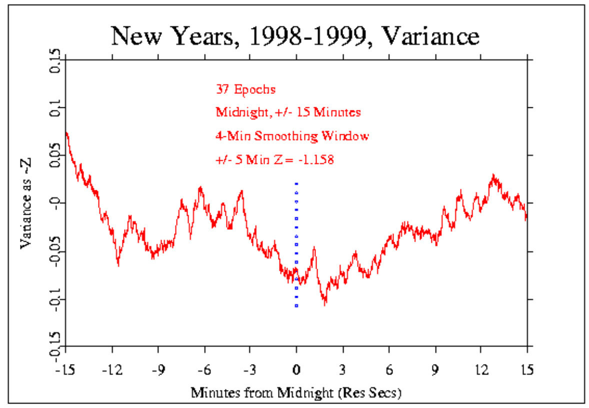
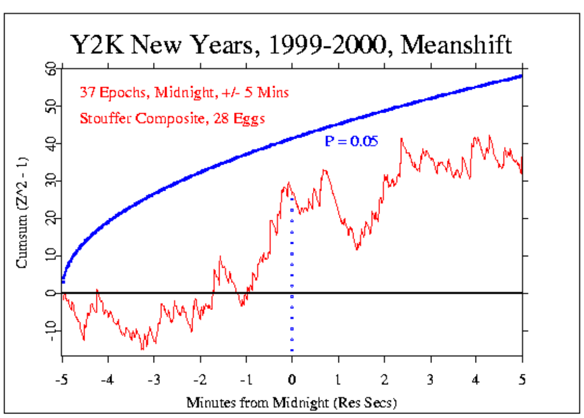


Fig. 2 New Year transition, 1998 to 1999. On the left, the cumulative deviation of the second-by-second Stouffer *Z*-score across 9 eggs is shown for the 10-minute period centered on midnight. On the right, the second-by-second variance is shown, smoothed by a 4-minute moving average, during 30 minutes centered on midnight.

1999-2000

For the much anticipated "Y2K", the meanshift measure again conformed reasonably to our prediction, with a modest positive trend. The terminal value corresponds to a probability of 0.128. This was the first year for which an *a priori* prediction for variance reduction was made, by Dean Radin. The analysis method was not prespecified, however, so the current procedure, which was developed at that time, is applied *post facto* for 1999-2000. It is fully *a priori* in subsequent years. The minimum reached by the smoothed variance was extreme, with only about 1% of the permutations showing a deeper minimum ($p = 0.016$). About a third of the cases were closer to midnight in the random permutations ($p = 0.312$). The combination of magnitude and proximity yields a joint probability of $p = 0.005$. The robust *VT* statistic for 1999-2000 gives a less impressive probability of 0.0965 (0.115 for *VxT*).). The simple measure of the reduction at midnight ± 5 min yields $Z = -1.166$ ($p = 0.122$).



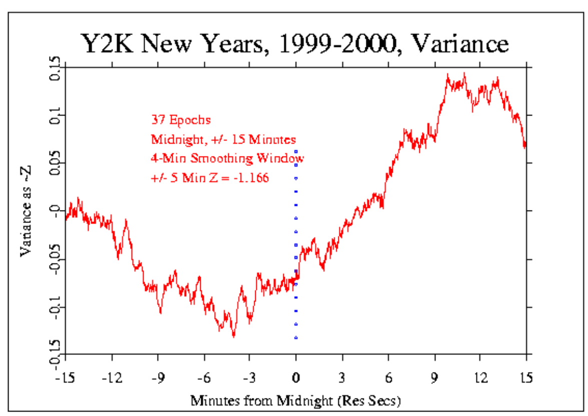
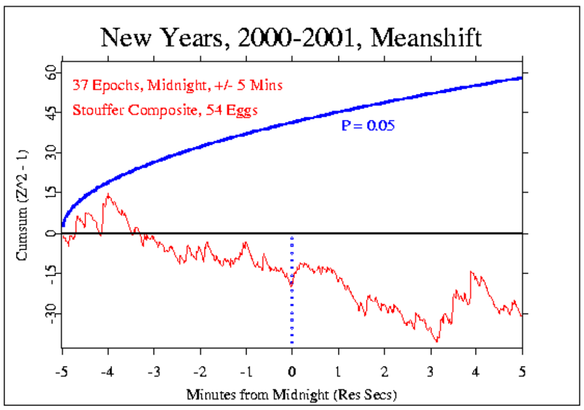


Fig. 3 New Year transition, 1999 to 2000. On the left, the cumulative deviation of the second-by-second Stouffer *Z*-score across 9 eggs is shown for the 10-minute period centered on midnight. On the right, the second-by-second variance is shown, smoothed by a 4-minute moving average, during 30 minutes centered on midnight.

While we should be careful with speculations based on details of the graphical representations, it is worth noting that the peak reduction in this intensely anticipated "Millennial" New Year began several minutes early, and was the strongest of the six years we have recorded

2000-2001

The New Year transition from 2000 to 2001 was not auspicious for the hypothesis. The meanshift analysis showed a persistent trend opposite to the prediction, with a terminal probability of p = 0.812. The variance measure also did not show the expected reduction around midnight. The deepest minimum reached by the smoothed variance was exceeded over half the time (p = 0.565), and it is not especially close to midnight, with 53% of the random permutations closer (p = 0.527). The combination of magnitude and proximity yields a joint probability of p = 0.298. The robust *VT* statistic for 2000-2001 gives a probability of 0.523 (0.265 for *VxT*).). The simple measure of the reduction at midnight ± 5 min yields $Z = 0.446$ ($p = 0.672$). In sum, all the tests show the same outcome: no indication of structure related to the New Year transition.



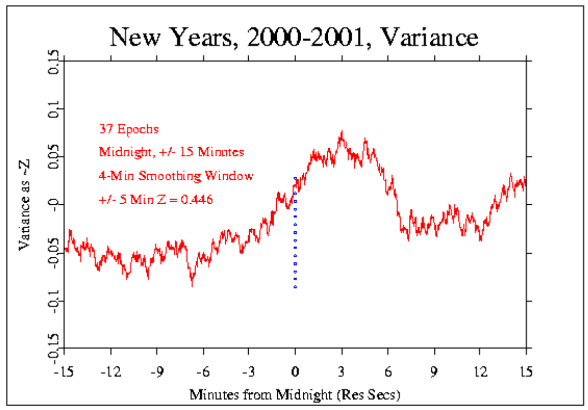


Fig. 4 New Year transition, 2000 to 2001. On the left, the cumulative deviation of the second-by-second Stouffer Z-score across 9 eggs is shown for the 10-minute period centered on midnight. On the right, the second-by-second variance is shown, smoothed by a 4-minute moving average, during 30 minutes centered on midnight.

2001-2002

For this year, the meanshift is again not distinguishable from a random walk, and the calculated probability is 0.291. The variance measure, in contrast, has an impressive appearance that is a classic match to the prediction of reduced variance around midnight. However, appearances may deceive somewhat, for the permutation analysis shows that the deepest minimum reached by the smoothed variance was exceeded more than 80% of the time (p = 0.831). On the other hand, the minimum was very close to midnight with only 5% of the random permutations closer (p = 0.048). The combination of magnitude and proximity yields a joint probability of p = 0.039. The robust *VT* statistic for 2001-2002 gives a probability of 0.023 (0.030 for *VxT*).). The simple measure of the reduction at midnight ± 5 min yields $Z = -1.376$ ($p = 0.084$).

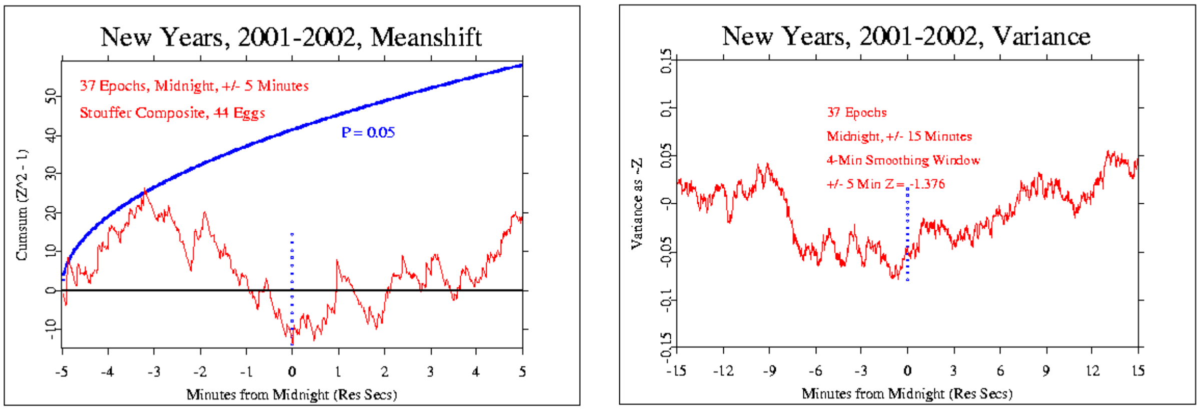


Fig. 5 New Year transition, 2001 to 2002. On the left, the cumulative deviation of the second-by-second Stouffer Z-score across 9 eggs is shown for the 10-minute period centered on midnight. On the right, the second-by-second variance is shown, smoothed by a 4-minute moving average, during 30 minutes centered on midnight.

2002-2003

The meanshift measure for this year strongly conformed to our prediction, with a positive trend throughout. The terminal value corresponds to a probability of 0.013. In the variance analysis, the result appears to be opposite to the prediction. The deepest minimum reached by the smoothed variance was exceeded only 19% of the time (p = 0.190), but it was very far from midnight, with 99% of the random permutations being closer (p = 0.992). The combination of magnitude and proximity yields a joint probability of p = 0.188. The *VT* statistic for 2002-2003 gives a probability of 0.3413 (0.364 for *VxT*).). The simple measure of the reduction at midnight ± 5 min more clearly rejects the hypothesis, given that the variance is increased, not reduced, with Z = 0.968 (p = 0.833).

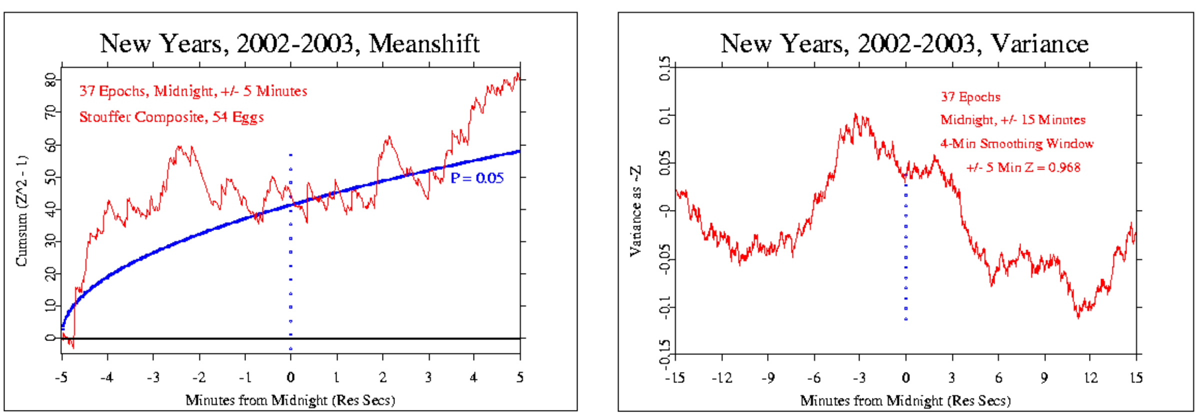


Fig. 6 New Year transition, 2002 to 2003. On the left, the cumulative deviation of the second-by-second Stouffer Z-score across 9 eggs is shown for the 10-minute period centered on midnight. On the right, the second-by-second variance is shown, smoothed by a 4-minute moving average, during 30 minutes centered on midnight.

2003-2004

The meanshift measure was persistently backward relative to our prediction, with a negative trend through most of the period. The terminal value corresponds to a probability of 0.897. On the other hand, the variance analysis again presents a classic picture conforming to the prediction, though it remains a subtle effect that is just marginally significant. The deepest minimum reached by the smoothed variance was exceeded about a third of the time ($p = 0.378$), but it was closer to midnight than in all but 9% of the random permutations ($p = 0.095$). The combination of magnitude and proximity yields a joint probability of $p = 0.036$. The *VT* statistic for 2003-2004 gives a probability of 0.0432 (0.060 for *VxT*).). The simple measure of the reduction at midnight ± 5 min yields $Z = -1.260$ ($p = 0.104$).

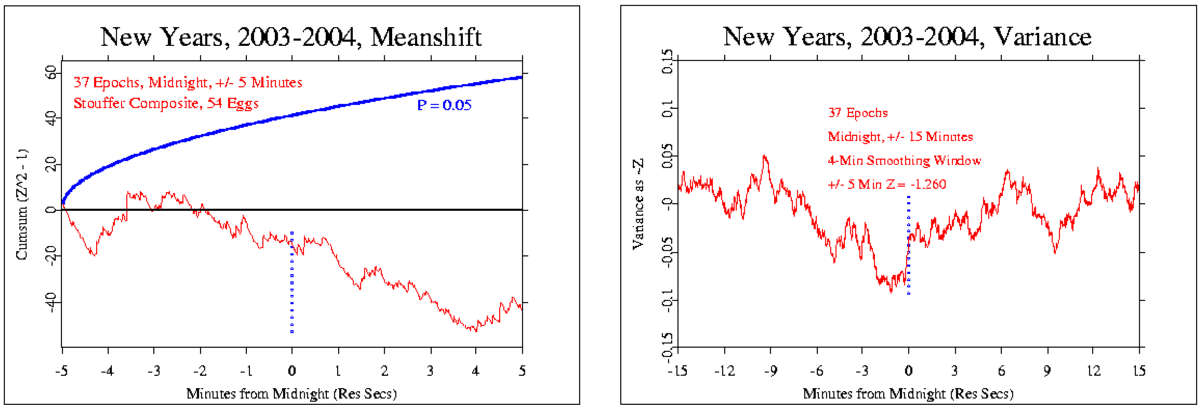


Fig. 7 New Year transition, 2003 to 2004. On the left, the cumulative deviation of the second-by-second Stouffer *Z*-score across 9 eggs is shown for the 10-minute period centered on midnight. On the right, the second-by-second variance is shown, smoothed by a 4-minute moving average, during 30 minutes centered on midnight.

COMBINING ACROSS SIX YEARS

Finally, we look at the combined data from all six years, presented in graphs similar to those for the individual years. For the meanshift measure, the Stouffer *Z* sequences for the six years were averaged using the same Stouffer *Z* procedure across years. The graph below left presents the result, which shows an impressive, persistent trend beginning about two minutes before midnight. Even with two of the six years showing a pattern that is contrary to the prediction, the composite is marginally significant. The terminal value has a probability of about 0.047. We get another perspective by combining the probabilities from the individual years. Rosenthal gives an algorithm that yields a Chisquare statistic from the sum of their logarithms: *Chisquare = sum(−2 * log (p))*. The result is $p = 0.053$ for the composite of six years, which corresponds well with the probability estimated from the Stouffer combination shown in the graph.

For the variance measure averaged across all six years, the permutation analysis applied directly to the combined data yields $p = 0.355$ for the minimum, $p = 0.239$ for its proximity, and $p = 0.087$ for the combination. The simple measure of the reduction at midnight ± 5 min yields a similar outcome of $Z = -1.448$ ($p = 0.074$). A more generous calculation of the variance probability, based on the *VT* statistic estimated for the individual years, is obtained by combining the probabilities from the permutation analyses using the Rosenthal algorithm. The result for the six years 1999 to 2004 is p = 0.0067 (0.0061 for VxT), which is considerably stronger than the estimate from the combined graph. The difference arises because the six years are spread out in terms of the proximity measure, so the combined graph is necessarily less sharply focused. Though there is a visually impressive minimum spike almost exactly at midnight, a deeper transient occurs some seven minutes before, and this is the one that is taken as dT in calculating the VT measure. This source of variability is ignored in the combination of individual year probabilities.

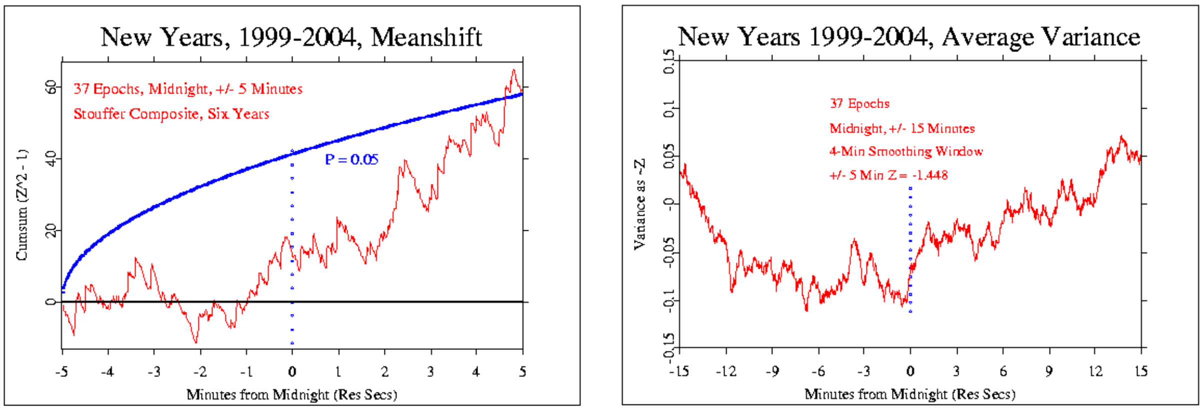


Fig.8 Left: Meanshift analysis for composite of six years, 1999-2004, midnight ± 5 minutes.; Right: Variance analysis for composite of six years,1999-2004, midnight ± 15 minutes.

DISCUSSION

More than any other notable moment in time, this one repeatedly gathers us into a common, easy frame of mind. The Y2K transition may have been an exception because of the strong focus on possible disastrous malfunctions of computer technology. Usually, however, New Years evokes no strong emotions, though there's more love in the air than usual, and isn't thought provoking or especially important. We come without much in the way of an agenda other than to wait together for the stroke of midnight, perhaps anticipating a hug or a kiss from someone close. We wait to lift a glass in a toast to the New Year, and we think a little about special times, some good, some bad, that are now past. Maybe we think about resolutions, though most of us know already that we won't change much, even while believing it would be a good idea. The New Year celebration is fun, and there really is a general, gentle movement together. The simple common interests that we share have no great importance, but they resonate and turn us all in the same direction for a brief time. We keep track while talking or dancing, or watching the show, and we are ready when the countdown begins. There are few moments when so many people think and feel in unison, and almost no others that are so light and pleasurable.

It is an opportune time to ask the scientific question for which the EGG network was designed. Does a coherent or resonant state of consciousness in the mass of humanity have an effect we can detect? There are alternatives to consider in case the evidence does point to an anomalous effect. One is that the experimenters' intentions and expectations may contribute to the anomalies. We will have to be clever and thorough to distinguish that from the nominal source of any effects. For example, though it is non-conclusive, we observe a substantial departure in the variance analysis for 1998-1999, but that question had not been posed at the time, and there is thus a *prima facie* case that the effect was registered in the data without consciousness of the experimenters, and only revealed *post facto,* years later. This is not the place to discuss observational or other theoretical models in depth, but I think it is likely that the GCP data can be a useful empirical resource for theorists to consider.

For the first two years, the focus of the formal analyses was on the meanshift, and in year two a form of variance was introduced. In subsequent years the formal variance analysis was also prespecified. If we compute the aggregate result from those four years the probability for the variance decrease at midnight is 0.022 (compared with 0.007 for all six years). In any case, it is correct to say that there is evidence for structure that should not be found in random data, associated with the brief period surrounding the New Year transition. The joint probability of the result for the meanshift and variance analyses is between 0.001 and 0.0003 (using 4 and 6 years, respectively, of the variance measure). The simple difference analysis of the central 10 minutes of the variance measure is less persuasive, with $p = 0.074$.

For a sample of different types of "control" comparison that are possible, the following figures show the variance calculation graph for real data from an arbitrary midnight, Nov. 15-16, 2003, (right panel), and for pseudorandom data (Walker, 2000) generated for Sept. 12-13, 2001 (left panel).

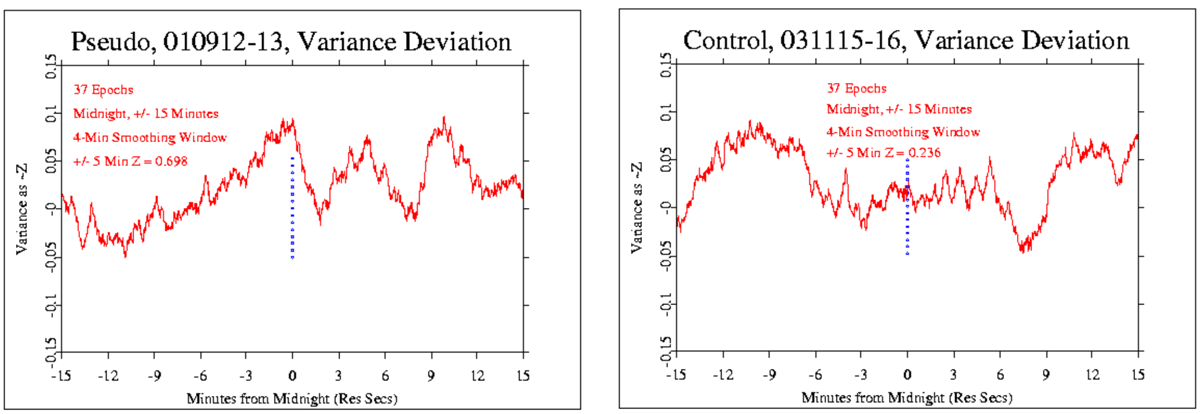


Fig. 9 The Variance analysis applied to control data from midnight, Nov. 15-16, 2003, left panel, and pseudo-random data generated to fill the data matrix for Sept. 12-13, 2001. In both cases, the calculations were exactly the same as those applied to the New Year data.

In contrast to the real New Year data there is no suggestion of symmetry around the focal moment of the midnight transition in either of these "control" datasets. On the other hand, we also can see that the range of variation is very similar to that in the real data. The implication is that the effects we see are very small, and precisely dependent on the analysis parameters. This is, of course, also confirmed by the statistical measures.

People ask, reasonably enough, why the effect isn't amplified by having 20 or 30 or 50 REG devices instead of just one. The answer lies in the assumptions we make. While it is natural to think in terms of familiar and successful models from physics, it most likely is inappropriate in practice when addressing subtle qualities of human consciousness. We are not looking at a direct causal relationship, or at simple “bit-flipping”. The empirical results indicate that the correlations we are finding operate on a large scale – what sometimes is referred to as teleological or goal-oriented anomalous effects. It appears that in this GCP experiment, just as in the laboratory with one person and one simple REG machine, the anomalous correlations are just adequate to indicate there is an effect, and thereby to answer our purposeful question in the affirmative: Is there a functional, creative and constructive role of consciousness in the physical world? The answer seems to be yes, but it is subtle, so subtle that it seems destined to remain in the realm of uncertainty. At the very least, this means we have interesting work ahead.

The movement of midnight around the world prompts a question about our assumptions with regard to the “global” nature of the anomalous effect. The underlying model, albeit informal, posits a nonlocal interaction, in which all the eggs in the network are in principle accessible to the effects of increased coherence of thought and emotion as people shift their attention toward the shared moment at midnight. Thus, as each time zone celebrates, we expect a correlated shift in all the eggs around the world. This leads to other questions such as whether the anomalous correlations are stronger when the midnight is in a heavily populated time zone, or one such as the New York City Times Square celebration that captures more widespread attention. An approach that deserves exploration in future work would postulate a relatively local model for the anomalous interactions.

There may be other potential explanations, but these results are consistent with the hypothesis that temporary large-scale interactions of human consciousness can have effects similar to those found in intention-based mind-machine experiments (Jahn, et al., 1999), and parallel to those in FieldREG experiments (Nelson, et al., 1998; Radin, et al., 1996). It is obvious that we are several steps from a demonstration that the special state of communal consciousness operationally defined by the New Year celebrations changes the behavior of our REG devices. At this point we do not have a causal explanatory link, but these analyses suggest that some new effective entity comes to exist in the world in conjunction with a shared state of mind engendered by a powerful focusing event. Our experimental design and analysis provides plausible evidence that coherent linkages in the consciousness domain may produce effective correlations or linkages among the independent random devices that comprise our GCP network.

The present analysis is one of many detailed, hypothesis-driven assessments we can make using the GCP database, and that is the goal of the GCP for the future. In this example, we test the hypothesis that our deep engagement with each other during New Year celebrations changes something measurable in the physical world. For a fuller understanding, we need a context of complementary analyses that consider and adopt or exclude viable alternatives, and look for the important factors contributing to the results. Our intention is to move toward increasingly sophisticated scientific perspectives on questions about subtle aspects of human consciousness, especially questions addressing interactions of consciousness with the physical world. The GCP database is an exploitable resource built on a solid foundation. We make efforts to ensure that the EGG network is unaffected by ordinary forces and fields, and we have comprehensive baseline and normalization procedures in place to guarantee the quality of the data. The result is a multi-year archive of broadly distributed data that are truly random – unless the hypothesized effects of consciousness intervene. The design is thorough and explicit, intended to leave no viable alternatives to the conclusion that the patterns we discover in the data are correlated with events in the world, and by inference with events in the realm of human consciousness.

ACKNOWLEDGEMENTS

The Global Consciousness Project is largely a volunteer operation, to which some 80 individuals around the world contribute. They are listed on the GCP website on pages linked under http://noosphere.princeton.edu/egghosts.html, and noosphere.princeton.edu/programming.html. For some of the analytical procedures in this paper, I am indebted to York Dobyns and Peter Bancel, who suggested ways to address complex statistical issues.

REFERENCES

Applications Weekly (1998). Epoch Averaging to Extract Weak Signals from Noisy Data *http://www.gage-applied.com/resource/apps1998/981028.htm.* Issue #148 - Oct 28 1998. Downloaded Feb. 25, 2004.

Jahn, R. G., Dunne, B. J., Nelson, R. D., Dobyns, Y. H., Bradish, G. J. (1997). Correlations of random binary sequences with pre-stated operator intention: A review of a 12-year program. *Journal of Scientific Exploration*, Vol. 11, No. 3, pp. 345-368.

Nelson, R. D. (2001). Correlation of Global Events with REG Data: An Internet-Based, Nonlocal Anomalies Experiment. *The Journal of Parapsychology,* Vol. 65, pp. 247-271.

Nelson, R. D. (2002). Coherent Consciousness and Reduced Randomness: Correlations on September 11, 2001. Journal of Scientific Exploration, Vol. 16, No. 4, pp. 549-570.

Nelson, R. D., Radin, D. I. Shoup, R. Bancel, P. A. (2002). Correlations of Continuous Random Data with Major World Events. *Foundations of Physics Letters*, Vol. 15, No. 6, pp. 537-550.

Nelson, R. D., Bradish, G. J., Dobyns, Y. D., Dunne, B. J., Jahn, R. G. (1996). FieldREG Anomalies in Group Situations, *Journal of Scientific Exploration,* 1996, Vol. 10, No. 1, pp. 111.

Nelson, R. D., Bradish, G. J., Dobyns, Y. H., Dunne, B. J., Jahn, R. G. (1998). FieldREG II: Consciousness Field Effects: Replications and Explorations. *Journal of Scientific Exploration*, Vol. 12, No. 3, pp. 425-454.

Radin, D. I., (2002). Exploring Relationships Between Random Physical Events and Mass Human Attention: Asking for Whom the Bell Tolls, *Journal of Scientific Exploration,* Vol. 16, No. 4, pp. 533–547.

Radin, D. I., Rebman, J. M., Cross, M. P. (1996). Anomalous organization of random events by group consciousness: Two exploratory experiments. *Journal of Scientific Exploration,* Vol. 10, No. 1, pp. 143-168.

Walker, J. (2001). Pseudorandom Data and Clone Analyses. *http://noosphere.princeton.edu/pseudoeggs.html.* Downloaded Feb. 25, 2004.