Global Consciousness: Manifesting Meaningful Structure in Random Data[1]

Roger D. Nelson

Global Consciousness Project

Abstract. The Global Consciousness Project (GCP) is a long-term experiment using a world-spanning network of physical random number generators to collect data continuously, 24/7, since 1998. We have recorded parallel sequences of data from the network, consisting of trials of 200 bits recorded each second at each node and sent to archiving servers in Princeton, NJ. A formal experiment ran for 17 years and comprised 500 replications of fully specified and pre-registered event analyses. These tested a general hypothesis that engaging events of deep interest to large numbers of people around the world would correspond to departures of the random data from expectation. Compounded results across the 500 events confirmed the hypothesis (Z = 7.31) and provided a sound basis for further analysis to help understand the effects. A number of explanatory propositions have been suggested, of which two stand out: a field-like model and an experimenter effect model. In this paper we consider several independent analyses and applications using GCP data, including analyses that examine all the data, not just the identified formal events. Neuroscience tools for assessing evoked response potentials (ERP) are applied to the GCP data to look for possible structure from a stimulus-response perspective. All of these additional analyses and applications identify structure that cannot be explained by an experimenter effect or goal orientation model. They are, however, naturally encompassed by field-like models.

Keywords: Global Consciousness Project, consciousness, mass consciousness, random number generator (RNG), network of RNGs, experimenter effect, field-like model.

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Highlights:

- During major events that engage the attention and emotions of large numbers of people around the world there is a compounded 7 sigma departure from random behavior in data from the GCP network.
- There is good evidence for structure in GCP data corresponding to movements of stock market valuations and Internet search trends.
- Multi-scale entropy calculations show widely distributed negentropy in the data, indicating that the actual data are a mixture of non-random and random data.
- When the event data are processed with methods drawn from neuroscience, the results show structure that has the same general form as brain responses to sensory stimuli.
- The evidence points toward something analogous to a field that can manifest influence widely and generally – though subtly – on the nominally random data.

In a sense it is fair to say the Global Consciousness Project (GCP) got its start when I read Teilhard de Chardin's *The Phenomenon of Man*, as a college student in 1960 (Teilhard de Chardin, 1955/1976). He wrote poetically about evolution from inanimate particles to organic compounds to living cells, and finally to self-aware human beings, who were able to think about this evolutionary process and to envision ourselves as its pinnacle. But Teilhard said, no, there is another stage ahead of us. Our destiny is to become a noosphere for the Earth, by which he meant a coherent sheath of intelligence that would envelop the planet as do the atmosphere and the ionosphere, but made of knowing and information. He thought it would be a long time – thousands of years – but an inevitable development driven by the increasing density and complexity of our world. Three decades after reading this inspirational book, circumstances and experiences led me to wonder if it might be possible, in our increasingly complex world, that the noosphere Teilhard wrote about might already have begun to develop, and that we might be able to get a glimpse of its formative presence. Here I want to chronicle the background of events and opportunities that led to the GCP, and to describe some of the most salient evidence for the possibility that we are indeed able to see a nascent global consciousness beginning to pulse with a life of its own.

The work begins in 1980 with a long series of experiments using physical random event generators (REG or RNG) in the Princeton Engineering Anomalies Research

(PEAR) lab, looking for effects of consciousness on physical systems. This research, always using rigorous procedures, provided evidence for small but persistent effects of conscious intention to change the behavior of RNGs. Over the course of a decade, on the order of a hundred people, quite ordinary in most respects other than their interest in participating in our hard-edged experiments, generated thousands of trials in what we called a tri-polar protocol. We asked them to change the behavior of the RNG to produce high numbers, low numbers, or to leave it alone to produce baseline data. Over the years we tried many variations and tested physical parameters including the speed of bit generation and the size of trials (20, 200, 2000 or 2 million bits per trial) as well as softer parameters like age and gender, the spatial and temporal distance between participants and the RNG, and whether the next intention would be selected by the participant or by a random process (Jahn et al, 1997). Although the absolute effect sizes are quite small, of the order of 10^{-4} bits deviation per bit processed, over the huge accumulated databases the composite effect exceeds 7-sigma ($p = 3.5 \times 10^{-13}$). Few of the tested parameters showed differentiating effects, but there were significant gender differences and modeling indicated that about 15% of participants were responsible for the anomalous deviations.

By the early 1990s we had miniaturized the RNGs and developed continuous data recording software, allowing an expansion to experiments in venues outside the lab, using laptops and palmtop computers. This second phase of RNG research was called FieldREG because we were taking the research into the field and because we wanted to study the possibility of a group consciousness field that might affect the behavior of our random sources in a similar way to the experiments with individuals in the lab. A major difference was that we no longer were looking at conscious intentions to affect the RNG, but rather something we conceived as effects of coherent group consciousness. Few if any of the people in the group knew anything about the RNG that we brought into the environment, so there was no intention directed toward the device (except, perhaps, for the experimenters' wish to learn something). Our analysis procedures changed from predicting a mean shift (high or low) to predicting a variance shift – deviations in either the positive or negative direction.

We identified two kinds of group situations, those that would generate coherent or resonant group attention, like rituals, group meditations, deeply engaging meetings, concerts, and performances. For comparison, we also collected FieldREG data in "control" venues with little coherence, like shopping malls, street corners, and railway stations. Our predictions of increased variance during coherent group situations were borne out in 70 independent experiments (Nelson et al, 1998). This work left little doubt that consciousness might alter the behavior of RNGs even without specified intentions,

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but also raised further interesting questions. What might happen if the RNGs were located at a distance, and what if we had a network of devices producing data? What if the group were very large – perhaps global in extent?

These and other questions led me to gather resources and invite friends and colleagues to help create the GCP in 1997. The development of software and hardware required several months, and in late 1998 we began to collect continuous sequences of data, 24/7, from each node in the network, at first mostly in the US and Europe. The Project grew to include more than 150 people around the world hosting an RNG node at various times. Over the next two decades, a large database of random numbers was recorded, consisting of parallel streams of 200-bit sums generated each second by research-grade random number generators in the world-spanning network. The formal experiment ran from August 1998 to December 2015 and comprised 500 formally specified, pre-registered analyses.

The general hypothesis for the experiment was that during major events that capture the attention of large numbers of people and synchronize their emotional responses, we would find departures from expected random behavior in the data from the GCP network. This general prediction was instantiated in a series of formal event hypotheses with fully specified parameters, i.e., the beginning time, the duration, and the intended analysis. This created a series of replications testing formally whether the swath or matrix of parallel random sequences would show indications of structure – where there should be none – during the defined global events. A standard analysis was applied to most events, looking at the network variance or "netvar". This was calculated as the squared Stouffer's Z across all RNGs in the network, each second. The result is a chi square distributed quantity with one degree of freedom that can be summed across all seconds of the event to give a score representing the variance change. The measure is also approximately equivalent to the degree of pairwise correlation among the RNGs. That is, when the network variance is significantly changed, we know that the data from widely separated physical RNGs have become correlated (Bancel & Nelson, 2008).

The accumulated departure from expectation for the formal GCP experiment exceeds 7 standard deviations, corresponding to odds of about 3 trillion to one against chance fluctuation as an explanation. It is a robust bottom line that provides a solid basis for deeper analysis of the database. As a result of the fully transparent experimental design and perhaps more importantly because all of the data are publicly accessible (global-mind.org/data_access.html), the GCP experiment has received little serious criticism. Beyond this, another benefit of the open source approach is that people interested in looking at the data can undertake confirmatory independent analyses.

Recent Explorations of GCP Data

The 24-year database (beginning in 1998) of continuous parallel random number sequences from a world-spanning network shows correlations of data deviations with major global events. (Nelson & Bancel, 2011) This is the simple but profound outcome of the GCP experiment. Although the basic finding is not disputed by knowledgeable commentators, there is considerable debate on what mechanisms or models might explain the anomalous deviations. Because the data are always publicly available, independent analysts are able to inform possible models by asking whether there may be meaningful indications of structure beyond the originally specified analysis based on the calculated variance across the network. As noted, the network variance analysis implies that the RNGs in the network become slightly correlated with each other even though they are separated by global distances. This is striking and difficult to explain using the simple physical models that work so well in our technological world, but it is a solid result, deserving attention and further exploration. For a broader view that provides valuable insight, I consider some independent perspectives and research:

- There is good evidence for structure in GCP data corresponding to movements of stock market valuations.
- Similarly, there are correlations of the data deviations with an index derived from popular Google search terms.
- On a more abstract level, multi-scale entropy (degree of randomness) calculations show widely distributed negentropy (increased structure) in the data, which indicates that the actual data, but not controls using pseudorandom or temporally scrambled data, are a mixture of non-random and random data.
- Deconvolution analysis (extracting original signal from combined data) also provides empirical evidence of temporal structure that should not exist in random data.
- When the database is segregated into categories reflecting different types of events, the results by category differ substantially.
- Finally, when the event data are processed using methods drawn from neuroscience, the results show structure that has the same general form as brain responses to sensory stimuli.

All of these perspectives showing structure that is separate and independent from the results of the original analysis are instructive. In particular, these findings shed some light on comparisons of field-like models versus experimenter effect models, as we will see.

Deeper and Broader Analysis

The GCP database includes many kinds of events, allowing comparison of the outcomes for several categories. We can assess differences based on event size (number of people engaged), valence (positive vs negative), event perspective or source (internal vs external), type of emotions (e.g., love or fear), and more. The 7-sigma accumulated deviation represents a robust bottom line that can, in principle, support a variety of secondary analyses. A number of these, including a covariance calculation, a distance between RNGs comparison, and a time-of-day assessment have shown substantial indications of structure in what should be random data, in addition to and orthogonal to the originally predicted network variance effect. In the past few years, using the formal data as well as continuing data from the network after the formal experiment ended, a number of new, independent analyses have been made. Here we describe them briefly, in the context of continuing efforts to characterize the GCP data and develop models that can account for the anomalous or unexpected structure including internal and external correlations of data that should be random and unstructured.

For much of its history, the most sensible way to model Global Consciousness Project data appeared to be some kind of consciousness or information field sourced in the attention of large numbers of people around the world focused synchronously on major events, driven by deeply felt emotions shared by many individuals. An alternative model invokes a kind of experimenter effect, where the people involved in and making decisions for the GCP use unconscious precognition of future results to determine the parameters of the experimental tests and thereby achieve desired outcomes. To help distinguish these modeling attempts, I will describe the results of various relevant but independent research programs that apply new analytical perspectives to the original data. It is important to note that these analyses are not data-snooping explorations but planned, specific research questions.

Stock Market Modeling

In March of 2019, Ulf Holmberg sent an email introducing his assessment, using economic analysis tools, of GCP data (represented by a quantity he calls "Max[Z],"

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drawn from GCP's automatically calculated 15-minute block measures). He said he found "a statistically significant link between large Z scores and global stock market returns. Not only is there a daily link confirming the existence of non -local consciousness but there is also a similar pattern predating actual stock market movements" (personal communication, 2019).

Holmberg's findings have since been published (2020) in the peer-reviewed *Journal of Consciousness Studies,* as "Stock Returns and the Mind: An Unlikely Result that Could Change Our Understanding of Consciousness.". His basic approach is to seek a time series correlation that is general and not a function of single large emotional events. He proposes that the correlations his analysis finds may depend on some external influence that affects both the stock market and the GCP data. To the extent such correlation holds, it may be possible to develop an application that could be used in market decision making.

To reduce the likelihood of misinterpreting a chance correlation, Holmberg applied the same analyses to 12 different stock indices from the US, Europe, and Asia. Significant results were found in 11 of the 12 indicators. Surprisingly, the strongest correlations tended to be with GCP data from the previous day, further supporting the possibility of actual applications – using the GCP data as a predictor for decisions. He writes (Holmberg, 2021):

> That the Max[Z] process is influenced by volatility can possibly be explained by acknowledging that financial markets tend to "pick up" the public's general mood (market sentiment) and adjust prices accordingly. Thus, what should affect Max[Z] should also affect market prices which in turn also should affect daily market volatility. (p. 218)

A simulation of various investment strategies shows that using the Max[Z] from GCP data may indeed help make profitable decisions. Figure 1 compares a "passive" vs "adaptive" approach, in which the latter clearly wins. Using the Max[Z] information alone yields a substantial advantage, and combining the adaptive and Z index indicators (Joint) yields a still better outcome. Though not shown in the graph, the joint approach reduces risk as well, so it could be a strategy that provides a relatively high return with relatively low risk.

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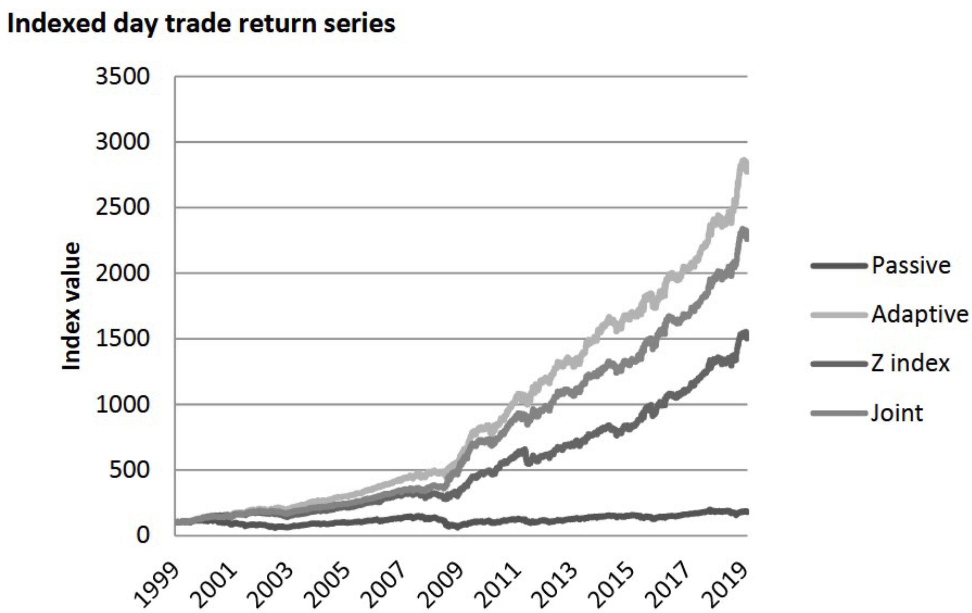
Figure 1

Simulation, Strategies for Positive Returns on Day Trades.



In August 2022, Holmberg set up a simulation study that can be thought of as an artificial GCP data fund to explore if the data could be put to practical use by traders and others. The study was set to run for a full year, but after 6 months it showed encouraging results: "The GCP data fund and its GCP data invariant counterpart have outperformed the market, even more than expected in these volatile times. The GCP data fund has also outperformed the control fund [by] between 3.5 and 4.3 percentage points after 6 months of trading which indeed suggests that the GCP data captures something not captured by regular market sentiment measures and that it can be put to practical use." (personal communication).

On July 31, 2023, the simulation was complete, and Holmberg (2023a) wrote:

> The potential advantage of using GCP data is studied in an out-of-sample simulation. The simulations are set to last one year, starting on 1 August 2022. Trades made during three different time periods were studied, and when the simulations ended on 31 July 2023, the results clearly showed that the GCP data can be used to inform traders. In fact, if the trades were made when the market opened in New York (UTC 14:30), the GCP data-informed trader achieved between 11.4 and 13.9 percent higher annual returns than their GCP data-invariant counterpart. (p. 16)

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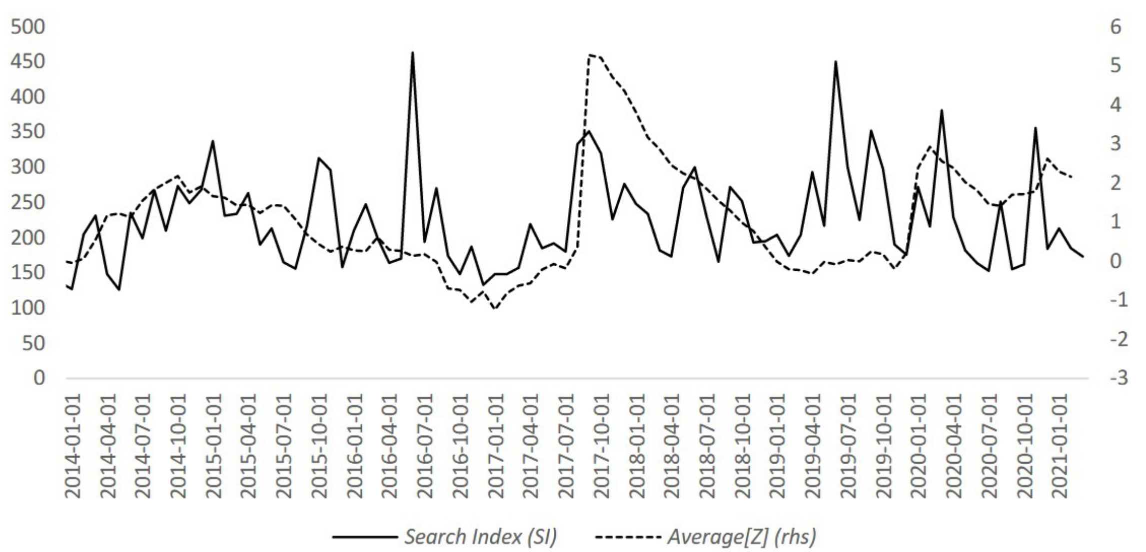
Global Attention and Engagement Index

Assessing a more general social measure, Holmberg correlates Google Trends search data with calculated daily aggregates of the second-by-second data generated by the GCP. Doing so, he finds that "all tested GCP data aggregates significantly covary with the Search Index and that the most significant correlation is found on its monthly average, $p < .001$." Given this validation of the GCP hypothesis, he intiated the construction of a Global Attention and Engagement Search Index (SI).

In his paper describing this index, Holmberg (2023b) gives examples of the small but significant correlation of the search metric with the average GCP [Z] score. The search index is based on monthly indexed Google Trends data on all unique words, covering the period from January 2014 to February 2021. From this data set he constructed a search index by summing the Google search index value on the five most frequent unique search words over the specified time interval. The search index is not designed to be an interpretable index value but is meant to capture "movements" in attention and engagement. The two measures, SI and Max[Z], are displayed in the next figure. They are visibly correlated, with clear parallel trends over time. Holmberg tests various models for the apparent correlation, and from the best of those it can be seen that public attention and engagement in a particular topic, proxied by Google Trends data, may persist for up to three months when the interaction with the change in average[Z] is taken into account. The interaction with the unfiltered GCP data aggregate is also found to be highly significant ($p < .0001$).

Figure 2.

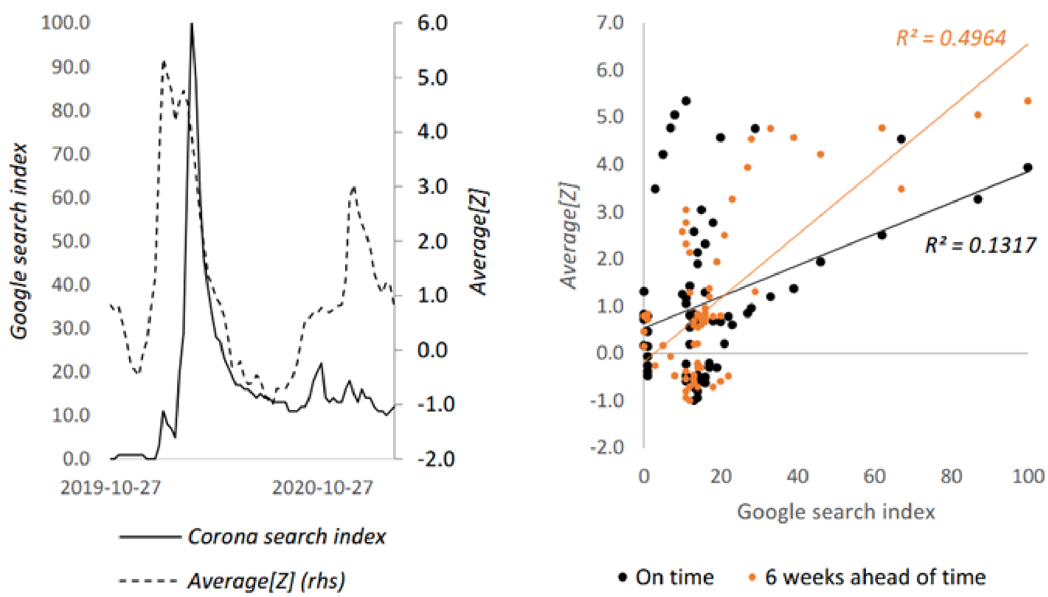
Global Search Index (Solid) and GCP Data (Dotted) Correlated Deviations 2014-2021



In the next example of the correlation of the global attention index with GCP data, the focus is sharper, looking specifically at searches for "corona" (referring to the corona virus). In Figure 3a, the correlation of the corona search index with GCP average[Z] is striking and highly significant. In Figure 3b, the correlation of SI with Average[Z] is shown, and we see that the correlation exists for data collected well ahead of the active "corona" search. These findings are intriguing and surprising, and deserve further research.

Figure 3

Indexed "Corona" Searches and Their Relation to the Normalized and Filtered Average[Z]



Based on several analyses of the link between GCP data and external variables like Google search terms and stock market indices, Holmberg (in press) writes:

> The results suggest multiple avenues for future research. Firstly, they point towards the practical utility of the GCP data for forecasters. Additionally, by validating several claims made by the GCP, they open the door for research into alternative theories on the nature of consciousness. Furthermore, as stock market returns, sentiment and focused attention tend to be tightly linked to the economic performance in general, it is likely that other economic metrics could be better understood by acknowledging the information embedded in the GCP data.

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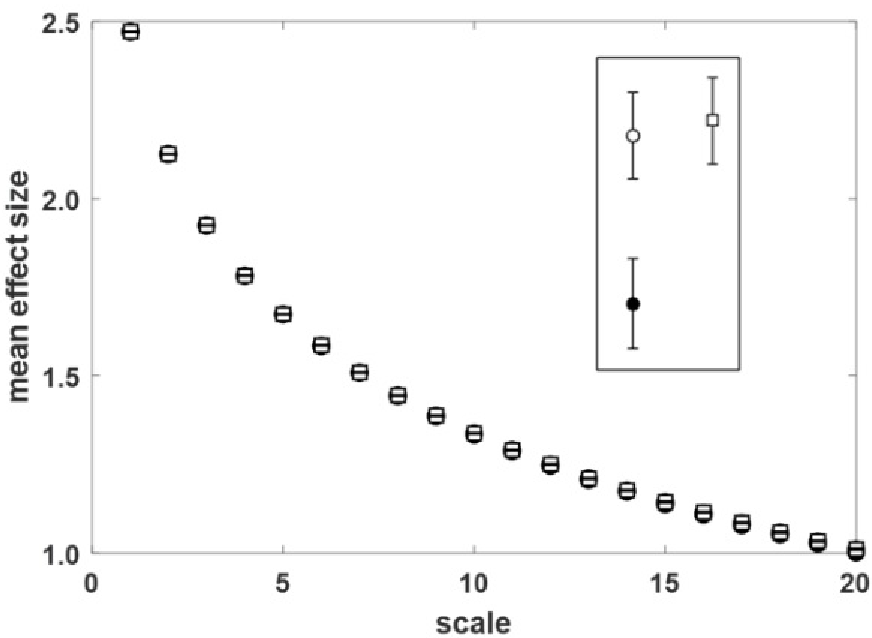
Multi-Scale Entropy

Truly random data can be regarded as fully entropic, in the sense that there is no structure or predictability, no information in sequences of numbers from true random number generators (RNG). Radin (2022) recently explored whether the "emergence of negentropic structure was limited to the 500 selected events [of GCP's 17-year formal experiment], or if it was reflective of a persistent, if subtle, relationship among mind, matter, and entropy." He used both a multiscale entropy (MSE) calculation and an approach asking if the data could be characterized as a convolution of many underlying nonrandom sequences. Both methods show widespread structure or negentropy in 23 years of the GCP database, and suggest a general, persistent relation of consciousness and entropy: It appears that "entropic movements are associated with many variables, such as source of consciousness (human, animal, plant), inherent talent, focus of attention and intention, coherence among groups, etc. At any given time, there are innumerable small to large groups focusing on something, and those are what the multiscale entropy method detects" (Dean Radin, personal communication, email, July 2022).

The multiscale entropy analysis is represented in Figure 4, which superimposes three very similar curves – for the original GCP data and for two control data arrays, one using scrambled original data and the other using pseudorandom data. The plot shows a stronger negentropic effect as the scale progressively includes larger amounts of data, in a smooth, non-linear relation. What is more interesting, the three curves appear to overlap but in actuality they differ significantly. If we look carefully, as shown for one scale (20) in the magnified inset, the curve for the original data (black dots) is significantly lower (i.e., more negentropic) than the curve associated with the randomly scrambled arrays (white dot) or the pseudorandom arrays (white square). This means that the negentropy exhibited by the GCP data is distributed throughout the database. The original event-based analysis of the GCP found negentropic effects in samples defined by great events, but there is much more structure than is revealed by that sampling. Does this generalized change in the data reflect a pervasive effect of the structuring power of consciousness? It certainly indicates that the data comprise a combination of non-random sequences intermixed with the random flow.

Figure 4

MSE Analysis of Arrays in Terms of Mean Effect Sizes and 95% Confidence Intervals



The inset shows a close up of these effects at scale 20. This curve consists of three overlaid plots: original data passing all four randomness tests (black circle), the same data randomly scrambled that also passed all four randomness tests (white circle), and pseudorandom data (white square).

Deconvolution

In addition to the multi-scale entropy approach, Radin conducted a second analysis designed to determine whether the data could be characterized as a convolution of many underlying nonrandom sequences. This entailed determining the maximum and minimum deviations in sequences, then doing a circular shift to put the max/min values in the center of the data array. The artificial spikes thus produced were removed and the shape of the resulting data curves revealed by smoothing. The results, shown in Figure 5 and most clearly in Figure 5d, show that data points near the selected extreme values also depart from expectation. In other words, the spikes were not isolated but were driven by an effect that was also spread out to nearby trials in the sequence of data. We see again empirical evidence of temporal structure that should not exist in random data – and by inference from the design of the GCP, the structure is associated with human consciousness.

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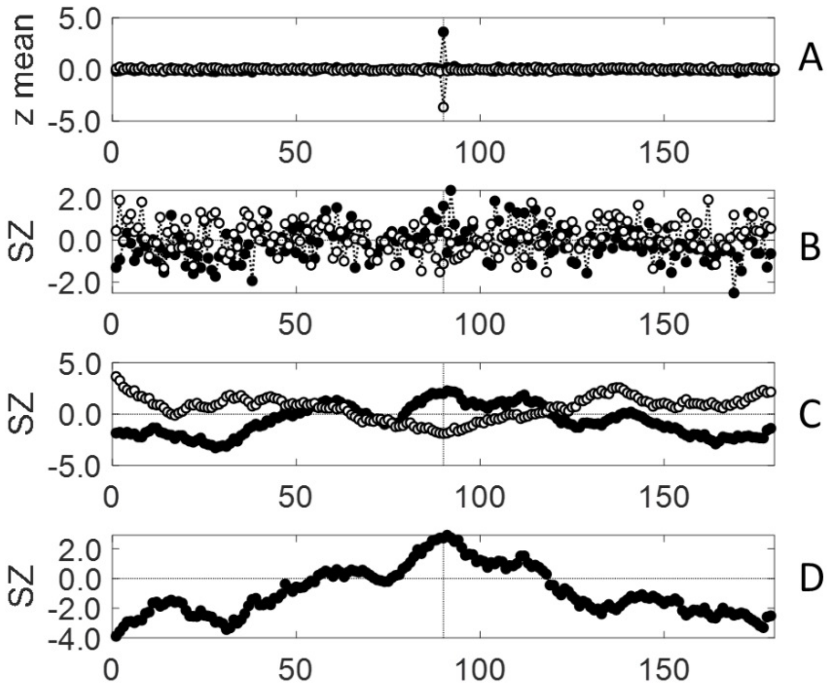
Figure 5

Ensemble Mean of 8-Minute Segments



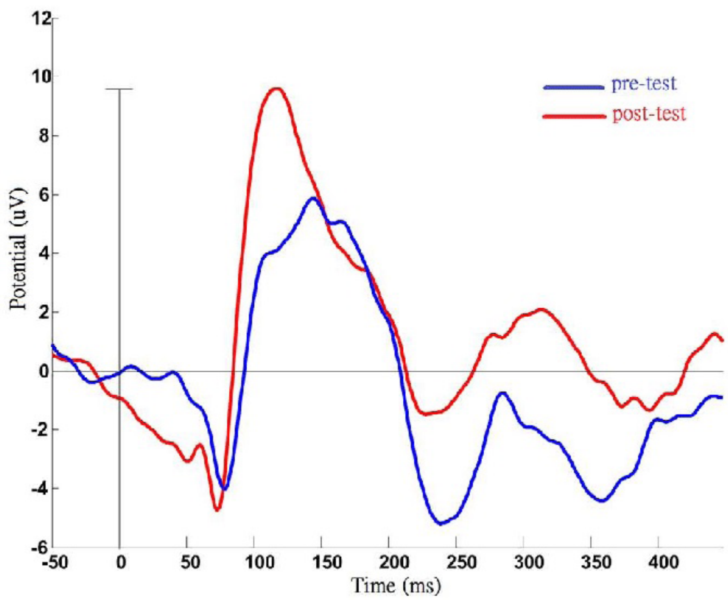
(A) Ensemble mean of daily 8-minute segment arrays centered on the maxima and minima exceeding a threshold of |z| ≥ 3.5. (B) Same data after the central spikes are removed and combined as a Stouffer Z. (C) Smoothed curves. (D) Difference curves.

Evoked Response

The GCP adopted early on a data display based on the cumulative deviation of scores from expectation. The measure shows persistent deviations as a consistent slope of the data curve and displays the history of the scores over the duration of the event. It culminates in the figure of merit for that event. This is a useful and informative display, which transparently shows consistent small deviations from expectation. But it needs to be interpreted with care because it is autocorrelated (each point is the sum of all previous values) and because it may show impressive but temporary excursions prior to the definitive terminal value. To observe from a different perspective what is happening to the data during a powerful, engaging event, we turn to a well-developed technology for studying the time course of brain reactions to sensory stimuli – the evoked response potential (ERP). For example, a flash of light produces activity in the occipital cortex amid a great deal of unrelated activity. To reveal the ERP, the flash of light is repeated many times, and the time-locked EEG responses are epoch-averaged and smoothed (Fig 6). Thus, the repetitions are stacked up in a summation that builds up the faint but consistent responses to the stimulus, while it washes out the noise because it is randomly related to the light flash (Li-Ting Tsai et al. 2016).

Figure 6

Example of a Visual Evoked Potential Response



Beginning shortly after the stimulus, the response drops below baseline, then rises to a positive peak after 100 to 200 ms, then drops again to a low level after which it stabilizes at baseline deviation.

In Figure 7, I compare the cumulative deviation graphic used for most GCP analysis presentations (Fig. 7A) to a data smoothing approach used in neurophysiology (Fig. 7B, C, D). Epoch averaging and smoothing reveal what looks like a classical evoked response in the data. I treat the events as repeated stimuli to the putative global consciousness and proceed with summation and smoothing. Averaged across many events, the smoothed result shows what happens in the data before, during, and after the event. This uses the procedures applied to brain EEG data as described above. Here the process is applied to a definitive subset of the GCP event data: all the *significant* short events (six hours duration). These arguably represent the effect we wish to understand, and because they all have the same time parameters, they can be combined without distortion.

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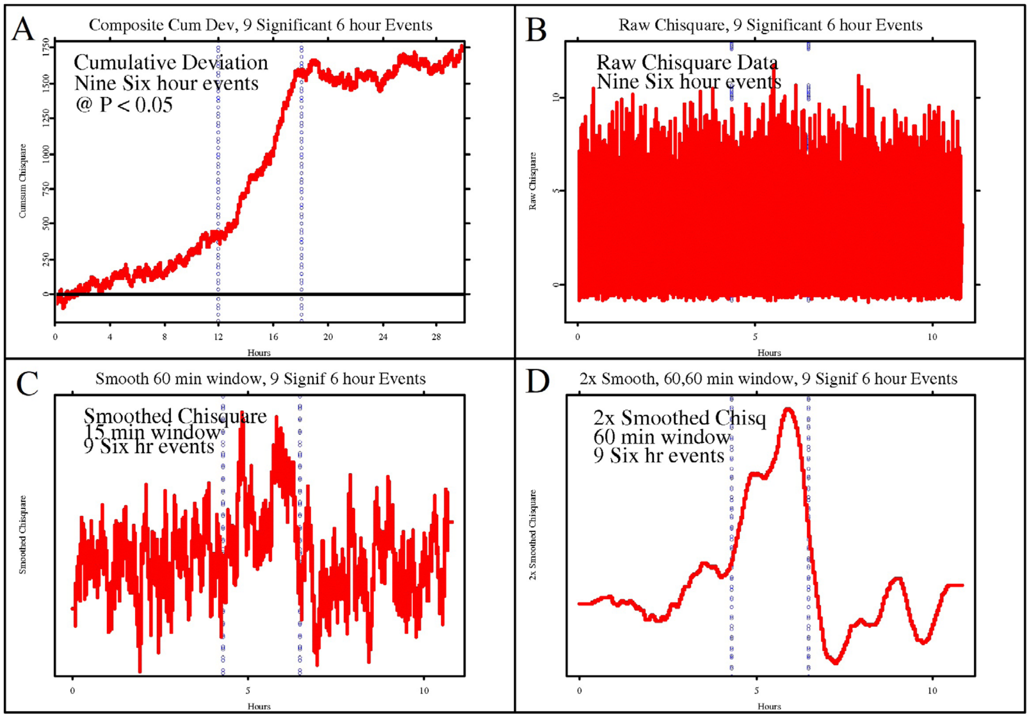
Figure 7

Average of Nine Significant 6-Hour Events

7A, cumulative deviation; 7B, original network variance data; 7C, same data, smoothed, 15-min window; 7D, additional smoothing, 60-min window



The upper left panel (7A) shows the cumulative deviation display of the data , which does not show the sharp inflections and negative trends predicted by Bancel (2017) in support of an EE model (see below). The other three panels show the epoch-averaged raw data and two steps of smoothing. The lower right panel (7D) clearly displays the striking pattern or structure that exists in the data, originally hidden in the noise, now revealed by the same signal extraction procedures used for brain EEG data (Nelson, 2020). The pattern is remarkably like that found in brain evoked responses, where a repeated flash of bright light, or repeated sharp sounds produce characteristic brain activity. The typical brain evoked response potential shows a strong positive deviation preceded and followed by weaker deviations of the opposite sign. This is the pattern shown in the lower right panel: a typical response to a stimulus. But here the data are not from an EEG, but from the world-spanning network of RNGs creating the GCP database. The pattern, while structurally similar to an ERP, has a very different time scale. Instead of a fraction of a second for the brain response, there is a GCP response over several hours. Is the structural similarity meaningful and instructive? I think it is. We are looking at a stimulus and response on a global scale, with a mass consciousness reacting to powerful world events.

sgeneral hypothesis that coherent attention in large numbers of people correlates with data deviations in a world-spanning network of RNGs during major global events. Efforts to explain the correlations have excluded mundane proposals (faulty equipment, lack of controls, erroneous analysis, fraud) leaving two reasonable alternative models. One proposes something like a nonlocal information field (IF) affecting the output of widely separated random devices, whereas the second suggests a kind of experimenter effect (EE) based on intuiting or precognizing outcomes, to allow felicitous selection of events and timing parameters that would capture large but natural deviations in the ongoing random sequence. Although the IF perspective is in principle capacious and capable of explanation of various structural and analytical aspects of the data, the EE perspective is essentially limited to explanation only of the original hypothesis test findings because that primary test is the only target or outcome experimenters could consciously or unconsciously consider when the test parameters were set.

In 2013, Peter Bancel presented a paper at the annual Parapsychological Association Convention titled, "Is the Global Consciousness Project an ESP Experiment?" The paper is a technical tour de force, with rigorous statistical assessment of various aspects of the database, intended to test whether a field-like model versus a selection model better fits the data. He concluded that a field model is virtually always the more effective choice. Discussing the multiple tests, he wrote (Bancel, 2013, p. 13),

> The five Z-scores can be combined to give a statistical measure of how strongly the analyses reject the selection hypothesis. A combined Z-score using Stouffer's method gives a Z of 3.98 (p = .00003), and using Fisher's method of combining P-values a Z of 3.70 (p = .00011) obtains. The tests thus reject the selection hypothesis with high significance. The analyses have also been done for the entire database and no evidence of residual or spurious structure detected by the tests is found in those data. To answer the question posed by the paper's title: No, the GCP is not an ESP experiment based on simple data selection. Rather, these analyses are consistent with a real, physical PK effect which perturbs the network RNGs.

But later Bancel (2017) did an about face, publishing a paper supporting an experimenter effect (EE) model, in which he presents graphical evidence of "fine tuning" suggested by sharp inflections at event specification boundaries, with negative data trends outside the event (Bancel, 2017). For example, in a graph he produced showing the cumulative data trace for all "short" GCP events, normalized by stretching or compression

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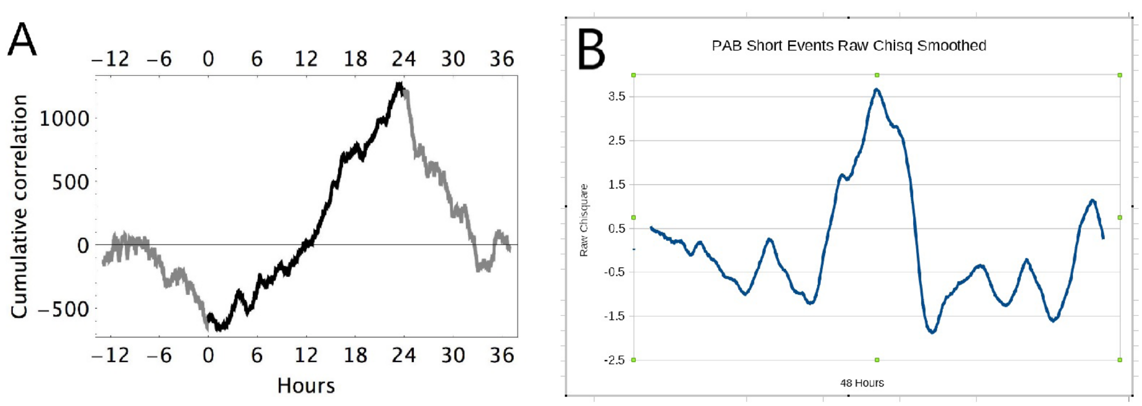
to a 24 hour duration for summation, there are notable inflections and negative trends at the start and end of the composite across events (Fig. 8A). He suggests this should be expected because the intuitive selection of start and end points in the data sequence that define a positive segment will cause the preceding and following segments to show a deficit or a negative tendency: "If there is a choice on how to partition a null dataset, so that the chosen segment has a mean > 0, then the remaining segment will necessarily (on average) have a mean < 0." In the context of ongoing parallel random sequences, this argument is reminiscent of the gambler's fallacy that says if you have had a run of heads, then tails must become more likely. Moreover, in the cumulative deviation of statistically significant short events, shown previously in Figure 7A, there is no sign of the postulated sharp inflections and negative trends. A good question is how the sharp inflections at exactly the specified event boundaries in Bancel's figure could possibly have come about, given the actual methodology for defining the events. Because the GCP is a replication paradigm, the parameters are most often set based on previous similar events. It is also worth noting that Bancel's calculation and figure use data from all "short" events, including more than 80% with insignificant, null, or negative outcomes.

Figure 8

8a. Bancel's Cumulative Deviation Composite of all Short Events (Normalized to 24 Hours). *8b. The Data from 8A Presented as Smoothed, Epoch-Averaged Network Variance Data*



Looking at the same data using the ERP procedures (Fig. 8B), a now familiar structure is revealed. To see this, data from Bancel's cumulative deviation plot (Fig. 8A) were de-convolved into their raw form (*Z* from chi square). The data were epoch averaged and subjected to smoothing using methods drawn from brain evoked response research – as detailed in Fig. 7B, C, D for the data from all significant short (6-hour) events. Again, there is a curve that appears to represent an evoked response to impactful stimuli in the GCP data. This view of the data provides a perspective consistent with a field-like model but not an EE model. It shows the kind of temporally local stimulus-response relationship characteristic of brain ERP, but now in random data from the GCP network.

For context, we need to look at the nature of the specific event hypotheses, which are set *a priori*, and are rigorously implemented. The experimenter effect model is arguably supported by noting that more events are suggested and described by Nelson than by others, but the count is not as biased as the EE modelers maintain. It is about half and half, and the positive analytical outcomes are as often from specifications by “others” as from those attributed to Nelson. More germane is the question whether the predictions and hypothesis specifications about an event are novel or are drawn from previous events of the same sort. It turns out, as indicated earlier, that the majority of event specifications are literal applications of the parameters defining a previous case. In other words, rather than an experimenter selecting parameters by intuition (or precognition), in most cases the specifications are not freely determined but prescribed.

Starting in early 2000, when the GCP had accumulated about 45 events in an exploratory mode, it began an effort to zero in on a set of specification that would work for many events. Some types of events were spread out over many time zones and the GCP could do no better than simply to specify a full 24 hour day. For more sharply focused events it seemed best to specify a few hours, and we settled on 6 hours as a period we thought would be sufficient to capture the original stimulus – the sharp point in time of the occurrence, with some hours for the news to spread and the emotional response to develop. There have been exceptions but most events in the later years of the Project, from about 2005, have used these more standardized specifications. This means that the flexibility implied, indeed required for an EE model, is not generally present in the GCP database.

Field-Like Models

An argument can be made that some form of field model representing consciousness is called for because there is a lot of structure in the GCP data beyond the deviation of network variance from expectation, which is the measure that yields the seven sigma formal result. The examples from Holmberg and Radin clearly make this point, as does a deeper examination of the GCP database, where we see, for example, that the results depend on factors such as the number of people engaged, the distance separating the RNGs, the strength of emotional engagement, whether people are awake or asleep, and so on (Nelson & Bancel, 2011). The data also show structure that qualitatively resembles stimulus-response patterns seen in brain activity when applying the signal processing tools of neuroscience. None of these extra signs of structure can be accommodated in an EE or goal orientation model. Instead, the evidence points toward something analogous to a field that can manifest influence widely and generally – though subtly – on the nominally random data.

We are far from describing such a field in precise terms, but it is possible to make some useful observations. There is no need for a field model to be seen as "force like" nor should it imply physical intervention to change bits. Rather, it seems most promising to think in terms of an information field. This notion could draw on the conceptual framework of the active information or pilot wave described by David Bohm (1980) – which allows actualization of a potential from the implicate order when a need for it exists in the explicate, real world. An RNG, or a network like the GCP, constitutes a "need" for information to satisfy the requirements of an experimental question, and the coherent mass consciousness engaged in major events is a potential source of the information that appears in the otherwise random experimental data.

Discussion

Independent assessments like those from Holmberg and Radin provide good evidence for structure not captured by the original network variance analysis specified for the formal GCP experiment. Not only is there correlation of the nominally random data with external variables like stock market fluctuations and Google search trends, there is also evidence of a generalized reduction of entropy in much of the data. Such indications are consistent with the idea that the network is reactive not only to the "stimuli" of events that we can readily identify from news reports, but also to widespread subtle influences. And when we look thoughtfully at the GCP data recorded during those major events, applying canonical techniques from brain EEG research, the results are strikingly similar in form to brain ERPs, even though the GCP responses occupy hours instead of a few hundred milliseconds. Again, a new analysis unrelated to the original figure-of-merit assessment reveals structure that should not be found in the output from a network of true random number generators, and again it is associated with consciousness. A major event is a stimulus that evokes a common response from large numbers of us. It links us in a coherent mass consciousness that is responsive to the evocative stimulus of a tragic happening or a celebratory moment. In an IF model, GCP data deviations are a proxy for (are linked to) our natural response to special moments in consciousness space. Our shared consciousness and emotions, if they are coherent, manifest structure that apparently is absorbed into the labile data of the RNG network.

In the analyses described here, there are meaningful relations between what would seem to be completely independent and unrelated elements in the world. What could explain the correlations of GCP deviations with the stock markets or with trends in internet search terms? How can we explain a generalized reduction of entropy in data from a globally distributed network of research-grade random sources? What can explain the correlation of data deviations with great events on the world stage? The best evidence points toward synchronous movements of consciousness as the common element that shape the anomalous structure in the search and market trends, the multi-scale entropy calculations, and in the GCP event data. These analyses show that when human consciousness is focused and engaged, when there is widespread coherence of attention and intention, there are effects – on sentiment, on markets, on what interests us, and on the random data from the GCP network. Consciousness is without question present in all these elements, including the GCP data, as shown by the correlations of data deviations with operationally defined moments of "global consciousness."

Returning to the question of suitable explanatory models, I think the evidence for goal orientation or experimenter effects is unpersuasive. On the global level of the experiment as a whole, it could be said that my intention as an experimenter is clear and strong. I do want to learn something, and I have expectations that will be tested against the data. But can that be construed as an intention to mold (via a postulated goal orientation that accesses the future) the experimental outcome to match my hopes and desires? Could my intention to learn how things work be satisfied by reaching into the future to see the experimental outcome so I could apply it to my choices for setting the GCP's specific hypotheses? I do not think so. Instead, thanks to my respect for science as a set of tools, I am deeply opposed to using, or more correctly said, to misusing those tools to support preconceptions or cherished notions. Logically, I could not satisfy my intention to learn something about the world by manipulating it to provide "desired" results.

Put in concrete terms, the idea that experimenter psi of this sort can explain the broad array of facts and findings in the GCP database is dubious. It is a bit much to expect from any individual (especially one whose performance as a participant in the PEAR PNG PK experiments was decidedly at the modest end of the scale). And for the small group of people who knew the GCP experiment and helped identify events, my guess is that their energies were, like mine, typically engaged in the social and personal event as it transpired – not in an attempt to get a particular outcome to satisfy some cherished notion.

No, although the experimenters' influence on the experiment is without question more likely than that of people who do not know it is happening, it seems clearly to be about aiming the instrument rather than dictating or influencing its readings. As I have mentioned elsewhere, the determinants of subtle phenomena like those we study in the GCP are multiple – the nominal source we call mass consciousness; the experimenters deciding where to aim the instrument; the question, whose nature necessarily influences its answer; and the universe, playfully and curiously forcing us to think deeply, and then to think again.

When great events fix the attention and emotions of large numbers of us, we respond in a moment of collective coherence; we turn on the bright light of synchrony. We become like a plasma of electrons that stop behaving as individuals and start behaving as if they are part of a larger and interconnected whole (cf. Bohm, 1980). The array of internal and external correlates of the GCP data all point to interconnected consciousness as the common factor that can explain the surprising intersections of random data and meaningful elements of human activity (Nelson, 2019). These effects may be small, but they are of extraordinary importance, for they show that we are connected in ways that we have not yet recognized. Our poets and artists have always seen our deeper layers, where we touch each other with faint awareness. Now scientists also are beginning to paint pictures of our true nature as linked but independent parts of a field of global consciousness that must soon awaken to its purpose. It seems possible that these surprising correlations are indications that we are on the verge of becoming Teilhard's noosphere, becoming intelligent stewards of our only home, the Earth.

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Conscience Globale : Manifestation d'une Structure Significative dans des Données Aléatoires

Roger D. Nelson

Résumé. Le Global Consciousness Project (GCP) est une expérience à long terme qui utilise un réseau mondial de générateurs de nombres aléatoires pour collecter des données en continu, 24 heures sur 24, 7 jours sur 7, depuis 1998. Nous avons enregistré des séquences simultanées de données provenant du réseau, composées d'essais de 200 bits enregistrés chaque seconde à chaque centre et envoyés à des serveurs d'archivage à Princeton, dans le New Jersey. Une expérimentation formelle s'est déroulée pendant 17 ans et comprenait 500 répétitions d'analyses d'événements entièrement spécifiés et préalablement enregistrés. Ces analyses ont permis de tester l'hypothèse générale selon laquelle les événements qui intéressent un grand nombre de personnes dans le monde correspondraient à des écarts entre les données obtenues de manière aléatoire et les prévisions. Les résultats cumulés des 500 événements ont confirmé cette hypothèse

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