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New Year's Eve as a Case Study in Experimental Metaphysics: Exploring Global Consciousness in Random Physical Systems

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HIGHLIGHTS

New research found that large groups focusing together at New Year's midnight produced small but consistent departures from randomness in a global network of random number generators.

ABSTRACT

This study explored the hypothesis that during moments of collective human focus and emotional resonance unexpected coherence will emerge in random physical systems. This mind-matter interaction hypothesis was tested during New Years Eve celebrations in each time zone using data from the Global Consciousness Project, a worldwide network of electronic truly random number generators. Analyses of data spanning the years 1998 to 2025 —including simple measures like mean shifts as well as changes in entropy, chaotic attractors, fractal dimensions, and Principal Components Analysis (PCA) —revealed statistically significant deviations at or within minutes of the stroke of midnight on New Years Eve, as compared to the same analysis applied to midnight transitions every other day of the year and to randomized permutation techniques (e.g., $p = 4.8 \times 10^{-7}$ for the PCA analysis). The study also found that the statistical deviations were stronger in time zones with higher vs. lower populations, suggesting that the magnitude of this psychophysical interaction was related to the number of minds engaged in a coherent focus of attention. Alternative mundane explanations, including possible environmental artifacts, were considered but deemed unlikely because the RNGs were specifically designed to exclude such influences. An imaginative roundtable discussion among the founders of quantum mechanics is used as a vehicle to discuss these results.

KEYWORDS

global consciousness, random number generators, New Years Eve.

INTRODUCTION

The relationship between mind-and-matter is one of the most enduring enigmas in philosophy. Ideas proposed to describe this relationship include *dualism*, which assumes that mind-and-matter are ontologically real but fundamentally different; *materialism*, which assumes that everything, including mind, is composed of matter/energy; and *idealism*, which assumes that everything, including matter, is composed of mind. A fourth approach, *dual-aspect monism*, is a philosophical framework derived from Leibniz's and Spinoza's philosophy of *neutral monism* (Atmanspacher & Rickles, 2022). It proposes that mind-and-matter are complementary epistemic aspects said to "split" or emerge out of a deeper holistic reality, and that these aspects are related not through ordinary cause and effect but are a-causally linked through meaning, viewed as a shared informational substrate that organizes both the mental and physical domains.

As an exercise in experimental metaphysics, we tested a prediction based on dual-aspect monism by analyzing data from the Global Consciousness Project (GCP)—an ongoing experiment based on the results of a half-century of laboratory-based mind-matter interaction experiments using electronic truly random number generators (RNG) as the physical targets (Bancel & Nelson, 2008; Bösch et al., 2006; Nelson & Bancel, 2011; Nelson et al., 2002; Radin & Nelson, 1989; Radin et al., 2006). Those studies suggest that focusing one's intention, or possibly just one's focused *attention*, toward a random physical system can influence its probabilistic structure (Jahn et al., 2007).

The GCP employs quantum-based RNGs distributed around the world as a way to detect statistical anomalies hypothesized to be correlated with global events of collective emotional or psychological significance. In the present case we focused on the meaningful and globally shared anticipation of celebrations at New Year's Eve – a repeatable and predictable moment in time characterized by synchronized human attention, festivity, and symbolic transition. According to dual-aspect monism, that collective moment of collective, coherent anticipation might manifest as an observable coherence effect in RNG data around the stroke of midnight. If such an effect were found, it would provide empirical support for metaphysical (in the philosophical meaning of that term) frameworks that challenge the materialistic assumption that mental activity and brain activity are equivalent. It would instead point toward a unified model of reality that regards subjective and objective realities as deeply interdependent.

METHOD

Hypothesis

The hypothesis tested was that a few minutes around midnight on New Year's Eve the random data collected by the GCP would become more structured. There may be numerous ways that a presumed upsurge in order might be expressed, so several types of analysis were employed, each examining a different aspect of how a random time series might be affected by a purported collective mental coherence effect.

The analytical methods used, described in more detail later, included ways to detect (1) a shift of the mean, (2) a chaotic attractor, (3) sample independence, (4) fractal dimensions, (5) nonlinear dependencies, and (6) the effects of splitting the data into high- and low-population time zones to see if the proposed effect varied with the inferred number of collective minds.

Hardware

The truly random number generators (RNG) used in the GCP are electronic circuits where the randomness is based on several forms of physical noise, including quantum tunneling, a phenomenon whereby an electron passes through an energy barrier which, from a classical physical perspective, has insufficient energy to overcome that barrier (Price, 1992). Tunneling occurs because of the quantum wave-like nature of particles, whereby the particle's non-physical wavefunction extends through the physical barrier. Tunneling events take place at what is considered to be fundamentally unpredictable latencies, and the uncertainty of that timing is one of the key sources of random noise in the RNG.

The noise signal is then amplified, periodically sampled to turn it into binary bits, and then the bits are passed through an exclusive-OR (XOR) logic gate that creates an output stream of bits (0s and 1s), where each bit is completely independent and where the 0s and 1s are identically distributed (see Supplementary materials in Bancel (2017) for details). For ease of exposition, the random bit stream generated internally by the RNG electronic circuitry will henceforth be referred to as *pre-XOR*, and the observed output bits as *post-XOR.*

The XOR logic in an RNG is an important design feature because it decouples the post-XOR RNG output from environmental influences. For example, strong fluctuations in line power might disrupt the electronic circuits in an RNG and in so doing could influence the pre-XOR bitstream. But even if that disruption was so strong that some of the electronic components failed and the pre-XOR bitstream began to only produce say, 0 bits, the XOR logic would cause the post-XOR output to move *toward* mean chance expectation, rather than away. To further inhibit environmental influences, RNGs are housed within grounded metal enclosures and the computers they are attached to use voltage regulators to smooth out possible environmental noise or glitches that occasionally appear in line power.

Before being used in the GCP, each candidate RNG was tested for statistical randomness by passing its post-XOR output through a randomness testing suite, like the National Institute of Standards and Technology's Statistical Test Suite (Information Technology Laboratory: Computer Security Resource Center, 2016). RNGs that passed the statistical tests were then sent to locations around the world and hosted on computers located in homes and offices. The host computer informed the RNG to generate 200 bits per second, and the sum of those bits was a random sample with a mean of 100 and a standard deviation of $\sqrt{50}$. Every five minutes, all of the random samples generated during that period were uploaded to a web server that collects data from all of the RNGs. To maintain synchronization across the separate RNGs, each generated sample was time-stamped to Coordinated Universal Time.

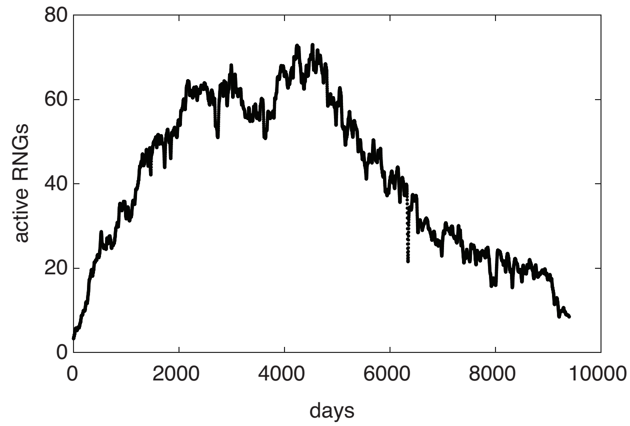

Figure 1. Number of RNGs running simultaneously in the GCP network, from 1998 through 2025, smoothed with a 30-day moving window.

Analytical Methods

Preprocessing

The daily data file generated by the GCP web server consists of a two-dimensional matrix X × Y, where X is 86,400 rows, one per second, and Y is the number of RNGs reporting that day, with one RNG per column. Missing data, which can occur if an RNG goes offline or if samples are not uploaded properly, are indicated by a missing element in the matrix.

For the present study, all data from the GCP web server were downloaded using *wget*, as described here: global-mind.org/data_access.html. The daily files available from 1998 through 2025 consisted of 116 GB, representing about 33 billion random samples or 6.6 trillion bits. Figure 1 shows the numbers of RNGs running daily over that time period, smoothed with a 30-day moving average. The decline around the 5000th day is related to the end of the formal period of experimentation, but the system with fewer RNGs has continued to collect data. A newly designed GCP system (Global Consciousness Project 2.0, n.d.) was launched in 2023 and has replaced the original GCP as the primary data collector.

To prepare the data for the present study, the daily files from each year's December 31 and January 1 were combined into a single two-day file. All samples in each file were examined for possible outliers, such that any individual sample less than 55 or greater than 145 was set to *nan* (not a number), as recommended on the GCP website (global-mind.org/gcpdata.html). These thresholds were used because samples exceeding those values were 6.5 sigma deviations from chance expectation and as such were considered spurious.

Then the empirical mean (μ) and standard deviation (σ) of all samples (s) for each RNG per day were determined, and a z score was created for each sample from each RNG as $z = (s - \mu)/\sigma$. The next step used all acceptable z scores per second (i.e., per each row), combined as a Stouffer Z, i.e. as $sz = \sum z / \sqrt{N}$, where N was the number of summed z scores and was thus the same as the number of RNGs running that second.

The next step was to concatenate these z scores from the second half of December 31 (i.e., second 43,201 to 86,400) to the first half of January 1 (second 1 to 43,200). This created a single array of 86,400 z scores. This array was used because the first second in each daily file began at UTC+0, and thus to capture the stroke of midnight in each time zone we needed data from the latter half of December 31 and the first half of January 1.

This same procedure was then followed for the midnight transitions from January 1 to 2, January 2 to 3, and so on, for all pairs of adjacent days throughout the year. These other midnight transitions were used as a control dataset to test if the results observed on New Years Eve might have been a day-transition artifact and to provide a statistical assessment of the New Years Eve results. The following analysis used these preprocessed files.

Mean Shift Analysis

To center the stroke of midnight at the middle of each hour corresponding to a time zone, each 24-hour z array was begun at the first half-hour (i.e., at second 1800). A similar array was then formed that contained the number of active RNGs per second. Because of that initial half-hour shift, the UTC-10 time hour was not available, so for each of the remaining time zones, from UTC-9 to UTC+12, plus UTC+5.5 for India, a block one hour in length was formed. Time zones at UTC+13 and +14 are located over the Pacific Ocean, but the estimated population in those zones is so small that excluding them from this analysis was deemed acceptable.

A matrix (*M*) was then formed as 23 hours × 3600 samples per hour. From this a weighted z score was formed per second as $z_w = (\sum M \times n)/\sqrt{\sum n^2}$, where *M* was the aforesaid matrix and *n* was the number of RNGs contributing to that matrix per second. This formed an array of 3,600 weighted *z* scores. This array was calculated for every midnight transition of the year, and then checked with a sequential randomness test (Matlab function *runstest*) (Wald & Wolfowitz, 1940). Any array resulting in $p < 0.05$ from that test was excluded from further analysis to eliminate arrays with temporal dependencies. The New Years Eve array passed this criterion, but 8 other days were excluded.

The retained arrays were then smoothed using a moving mean of 3 minutes to more easily visualize the results at a time-scale more suited to variations in human attention. That is, the growing anticipation leading up to midnight and the subsequent celebrations and fireworks would have not occurred in a matter of a few seconds, but minutes. That smoothed curve was then normalized as z_N (Matlab function *zscore*). To statistically evaluate the degree to which z_N deviated from chance expectation, the same procedure was applied to all other midnight transitions in the year, ultimately producing a smoothed matrix *S* = of length 3600 samples × 366 days, where day 1 was New Years Eve.

Then the first second of the day 1 array was compared to same values at the same second in the other 365 days. This was formed as a simple count $c = \sum(z_1 \geq z_{2-366})$, where *c* was the sum of the logical comparisons (0 or 1), and then the statistical probability associated with each second was formed as $p = c/366$ and $z = norminv(p)$. To avoid situations where $p = 0$ or 1, when $c = 0$ the probability was set to $p = 1/366$, and where $c = 366$, $p = 365/366$. This nonparametric analysis was conservative because the maximum deviation was limited to $p = 1/366$ or $z = 2.7$ (or $p = 365/366$, $z = -2.7$). If the results appeared to be statistically stronger than that, then as a secondary approach the New Years Eve weighted *z* array was randomly permuted, then a moving mean of 3 minutes was formed and normalized, and this process was repeated 50,000 times. Then the aforesaid counting procedure was applied, but now the minimum $p = 1/50000$ or $z = 4.1$ (or $p = 49999/50000$, $z = -4.1$).

The next step was to form a joint probability that simultaneously captured the likelihood of the largest deviation in *z* scores in the 3600 second array (call this Δ) and also how far those deviations were located from the stroke of midnight (call this *δ*). That is, within the array of z_N values, we formed Δ = max(*z*)-min(*z*) for the New Years Eve data as compared to a similarly constructed Δ for all other midnight transitions. If the resulting *p* values were smaller than $p = 1/365$ (or larger than 364/365), then the alternative randomized permutation method was used. Then we formed $\delta = |max| + |min|$, where *max* was the absolute distance (in seconds) from the maximum *z* score deviation to the midnight, and *min* was likewise for the minimum distance. The associated probability for this measure was then $\delta_p = c/365$, or for the alternative method, $\delta_p = c/50000$. The joint probability was then $j = \Delta_p \delta_p$, which reflected the joint likelihood that a deviation as large or larger than the one observed occurred as close or closer as the New Years Eve array did to the stroke of midnight.

Correlation Dimension

A correlation dimension (CD) analysis provides insight into whether a time series is deterministic (e.g., a chaotic process) or stochastic (e.g., a truly random process) by measuring the geometric complexity underlying the system's dynamics (Grassberger & Procaccia, 1983). The method was originally developed for the study of deterministic chaos to quantify the complexity or "strangeness" of chaotic attractors. CD reflects how an attractor "fills" the embedding space, which in the present case was μ = 3 (i.e., three dimensions), and with a time delay of τ = 2 (meaning it considered adjacent elements of the array).

A significant decrease in CD in a portion of a random time series would imply a transition to uniform or periodic behavior. An increase would indicate the emergence of more complex behavior. The prediction in the present case is that New Years Even array would show a decrease in CD a few minutes around the stroke of midnight, as compared to the same analysis applied to the other midnights.

Note that in the present and the following four tests the analysis was applied to segments that were 36 seconds in length. This segment size was selected to provide a total of 100 segments covering the one-hour (3600 seconds) array. In addition, to evaluate the statistical likelihood of any observed deviations in CD the randomized permutation technique described above was used with 5000 permutations.

Permutation Entropy

Permutation entropy (PE) focuses on the relative ordering of values in a time series, providing a way to quantify the presence of randomness or order (Bandt & Pompe, 2002). The idea of PE is that it characterizes complexity based on the diversity of sequential patterns. Similar patterns signal more order, and diverse patterns signal more randomness. A significant change in PE would indicate that the temporal ordering of a portion of a time series became more (or less) predictable. The prediction for New Years Eve was that PE would decrease a few minutes around midnight. The embedded dimension used for this algorithm was again $\mu = 3$, and the time delay was $\tau = 2$.

Higuchi Fractal Dimension

An HFD analysis quantifies the fractal structure of a time series. It focuses on higher dimensional geometric properties of the series rather than one-dimensional temporal dependencies, like an autocorrelation (Higuchi, 1988). A decrease in HFD suggests the series has become "smoother," which would indicate a move toward uniform or periodic dynamics. An increase suggests the series has become "rougher" or more chaotic. The prediction for New Years Eve was that HFD would decrease a few minutes around midnight. The embedded dimension used for this algorithm was again $\mu = 3$, and the time delay was $\tau = 2$.

BDS Test

The BDS test evaluates if a time series is *i.i.d.* (independent and identically distributed) (Brock et al., 1996). It does this by constructing vectors from segments of a time series and measures how the points in those vectors cluster in phase space. If BDS increases, it indicates the presence of nonlinear dependencies. If it declines, the system is becoming more random. The prediction for New Years Eve was that BDS would increase for a few minutes around midnight. The embedded dimension used for this algorithm was again $\mu = 3$, and in this case $\varepsilon = 2$, where epsilon specifies the radius of the neighborhood used to count the proximity of points in phase space.

Autocorrelation Test

The autocorrelation (AC) test examined the random time series to identify sections exhibiting unexpected temporal dependencies. In the present case, the prediction for New Years Eve was the emergence of a positive autocorrelation in the data a few minutes around midnight.

Principal Components Analysis

The CD, PE, HFD, BDS, and AC tests each inspected a time series from different conceptual angles, providing complementary ways to assess the underlying structure and complexity of the system that generated the data. By combining all five methods with Principal Components Analysis (PCA), if that analysis showed a significant change at a predicted time, that would confirm that the RNGs that generated the time series were reacting to an external event. The inferred event in this case was, of course, the anticipation and celebration of New Years Eve by billions of people around the world.

Population Partition

To test if the results were related to the estimated population in each time zone, which would presumably reflect the "amount" of collective consciousness, the mean-shift analysis was applied to time zones assessed as being above and below the overall median population. The population estimates in each time zone were based on the United Nations World Population Prospects (population.un.org/wpp/), the World Bank Open Data (data.worldbank.org/), and the CIA World Factbook (www.cia.gov/the-world-factbook/).

RESULTS

Mean-Shift

The mean-shift test resulted in an hour-long data matrix of 23 times zones × 26 years = 598 events of interest × 3600 seconds, where second 1800 was midnight on New Years Eve. Figure 2 shows the resulting ensemble mean cast into per-second z scores by this analysis. When a moving mean of length 180 seconds (3 minutes) was applied to those data, and recast into a z score, the result is shown in Figure 3. The left side of Figure 3 shows the New Years Eve curve as compared to the same midnight transitions for all

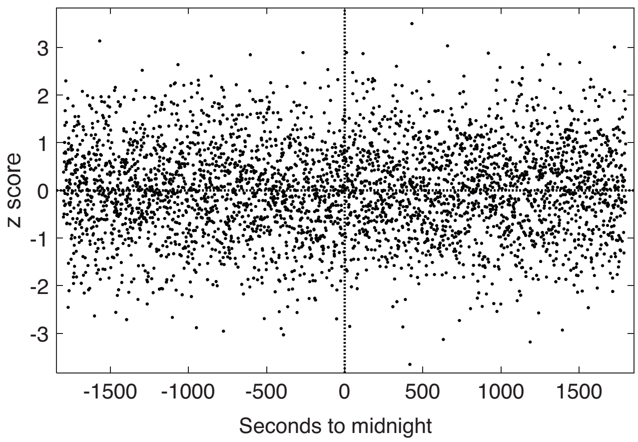

Figure 2. Stouffer Z scores per second from a half-hour before to after midnight across all time zones.

other pairs of days of the year. It shows z score deviations expected for a normal curve, namely that most of the deviations are from about –2 to +2, and that these deviations are uniformly distributed. The right side of Figure 3 shows the same curve statistically compared against 50,000 randomized permutations using the nonparametric counting procedure described above. One might argue that this deviation might have occurred due to mundane environmental effects. But that this would happen only on New Years Eve seems unlikely because the GCP network and storage of its data does not behave differently on that particular midnight transition as compared to any other day. The only obvious difference is that that specific midnight transition is very different *from a human perspective*. Three minutes before to three minutes after midnight was evaluated with False Discovery Rate at $p < 0.05$, and the drop about 2 minutes before midnight is significant, as indicated. In addition, the joint probability (jp) of the 6 sigma rise from 2.3 minutes before midnight to 2.0 minutes after midnight (ps = 0.104), times the proximity of that rise to midnight (pd = 0.0028), as compared to the same metrics applied to the other 365 days, results in jp = ps × pd = 0.00029.

CD, PE, HFD, BDS, AC tests

Figure 4 shows the results of the Correlation Dimension, Permutation Entropy, Higuchi Fractal Dimension, BDS and Autocorrelation tests. In each case, these analysis are applied to one hundred 36-second segments. To evaluate these tests each analysis is run with 5000 randomized permutations and then normalized using the nonparametric counting method. The False Discovery Rate is applied to segments 46 to 51, corresponding to –2.4 minutes before to 1.2 minutes after midnight, and the notch (in red) at 0 rising to a z score of 1 indicates significance at $p < 0.05$ adjusted for multiple comparisons. The CD, PE, and HFD tests are predicted to be negative around midnight, and BDS and AC are predicted to be positive. These predictions are based on the direction each of these specific statistical tests would make toward a *negentropic* (i.e., more orderly) outcome.

Principal Components Analysis

The Principal Components Analysis evaluates a composite of the CD, PE, HFD, BDS, and AC tests. Figure 5 show the results, indicating that the segment spanning midnight is associated with $z = -4.9$, $p = 4.8 \times 10^{-7}$.

Time Zones

Figure 6 shows the mean-shift analysis for twelve low population time zones below the median population across all time zones, with an estimated 629 million people, and for twelve high population time zones, with an estimated 6.8 billion people. The graphs indicate that after FDR from ± 3 minutes to midnight that only the high population partition shows a significant deviation.

RNG Synchronization

Some of the GCP RNGs are time-synchronized using the NTPv3 (Network Time Protocol version 3), other by a protocol called Win32Time on older Windows-based PCs. A test to quantify the synchronization among these RNGs showed that some were off by a second or more, while others exceeded a minute (Bancel, 2017). If one assumed that tight time synchronization among the RNG outputs was required, then this time-slippage might be a problem in interpreting the results.

To determine if such time offsets were indeed a critical factor in the present analysis, the timestamps associated with samples from each RNG were randomly circular shifted from –60 to +60 seconds, and this process was repeated for every RNG in each daily datafile. Then the New Years Eve analysis was recalculated and repeated 100 times to see if the effect observed in the original data would survive this temporal scrambling. Figure 7 shows that precise timing was not a factor in determining this effect.

DISCUSSION

All seven analyses — mean-shift, correlation dimension, permutation entropy, Higuchi fractal dimension, BDS test, autocorrelation, and Principal Components Analysis — revealed statistically significant deviations in the

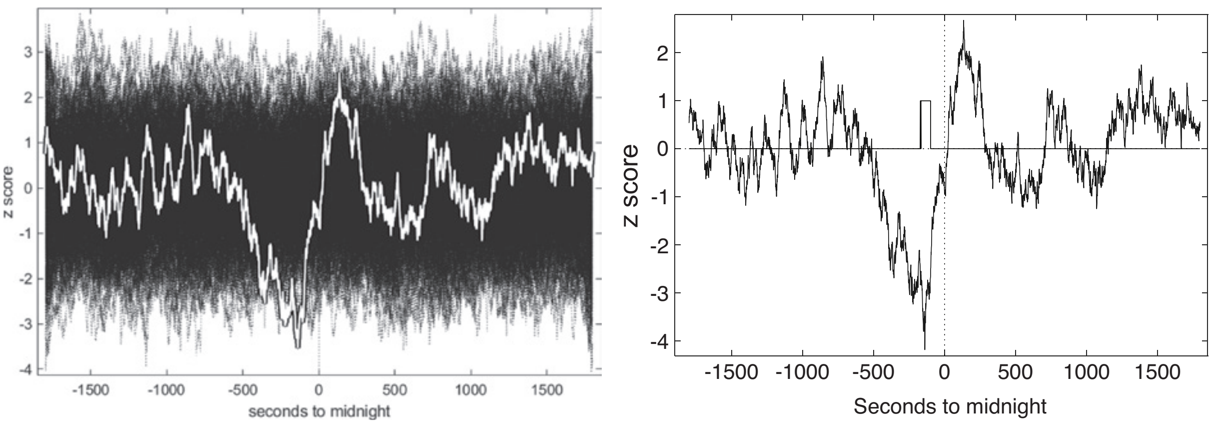

Figure 3. (Left) Three-minute moving mean applied to the per second z scores, in white, as compared to 365 midnight transitions calculated the same way on all other days of the year, in black. (Right). Comparison of the New Years Eve curve against 50,000 randomized permutations using a nonparametric counting procedure. The bar near midnight indicates a span of significant deviations at $p < 0.05$ (two-tailed) adjusted for multiple comparisons using False Discovery Rate in the range from 3 minutes before to 3 minutes after midnight.

GCP data minutes just before and after midnight on New Year's Eve. All of the deviations were significant and in the predicted directions. These results are in alignment with the hypothesis that collective attention and emotional resonance in anticipation of midnight on New Year's Eve influenced, or more precisely, was correlated with the behavior of truly random physical systems located around the world. The convergence of multiple statistical tests focused on different aspects of complexity and structure added weight to the idea that the observed patterns could not be attributed to a single analytical artifact.

Mundane explanations

The most likely ordinary explanation for these results is a systematic environmental influence, such as external electromagnetic influence of the RNG circuits, data logging or web server glitches associated with the formation of the daily datafiles, electrical power grid fluctuations associated with the transition to midnight on New Years Eve, or other ambient events that periodically occurred around midnight in each time zone. Such possibilities were considered and deemed unlikely because the mean-shift variation observed on New Year's Eve differed significantly from midnight transitions evaluated the same way across all other days of the year, and it also differed based on time zones with larger vs. smaller populations. In addition, as previously mentioned, the RNGs were designed in such a way that if the RNG components were externally influenced, even to the point of beginning to fail, their outputs would fail *toward* mean chance expectation rather than away.

Another possibility is if the present study was a "fishing expedition" to find a repeated moment in time that involved the majority of the world's population, and that showed a significant statistical "spike" after smoothing the data with an optimal window length. Regarding the first possibility, New Years Eve celebrations according to the Gregorian calendar are an obvious candidate for testing the GCP hypothesis, in that this event arguably involves a large percentage of the world's population at a precise moment in time in each time zone. By contrast, other large-scale events, like Chinese New Years, also repeats every year, but it does not happen on the same date, nor is it followed by the majority of the world's population. Other events, like a "global minute of silence" at 12 noon in each time zone on September 21, a United Nations initiative associated with the International Day of Peace, repeats each year and across time zones, but it does not attract a majority of the world's attention.

A second criticism could be tested by using smoothing windows ranging from 2 minutes to 10 minutes in length. Figure 8 shows the results with overlapping curves, which indicates that the general shape of the curve remains the same regardless of the window size. Thus, there was nothing special about the use of a 3-minute smoothing window. In fact, this analysis revealed that a 7-minute smoothing window would have provided a statistically stronger outcome. In addition, use of a mean-shift analysis was the first method applied because it was the simplest way to detect a deviation from chance expectation given this type of event and this kind of data.

Ideally, to provide even higher confidence in these results, the observed effect would be significantly detectable on a

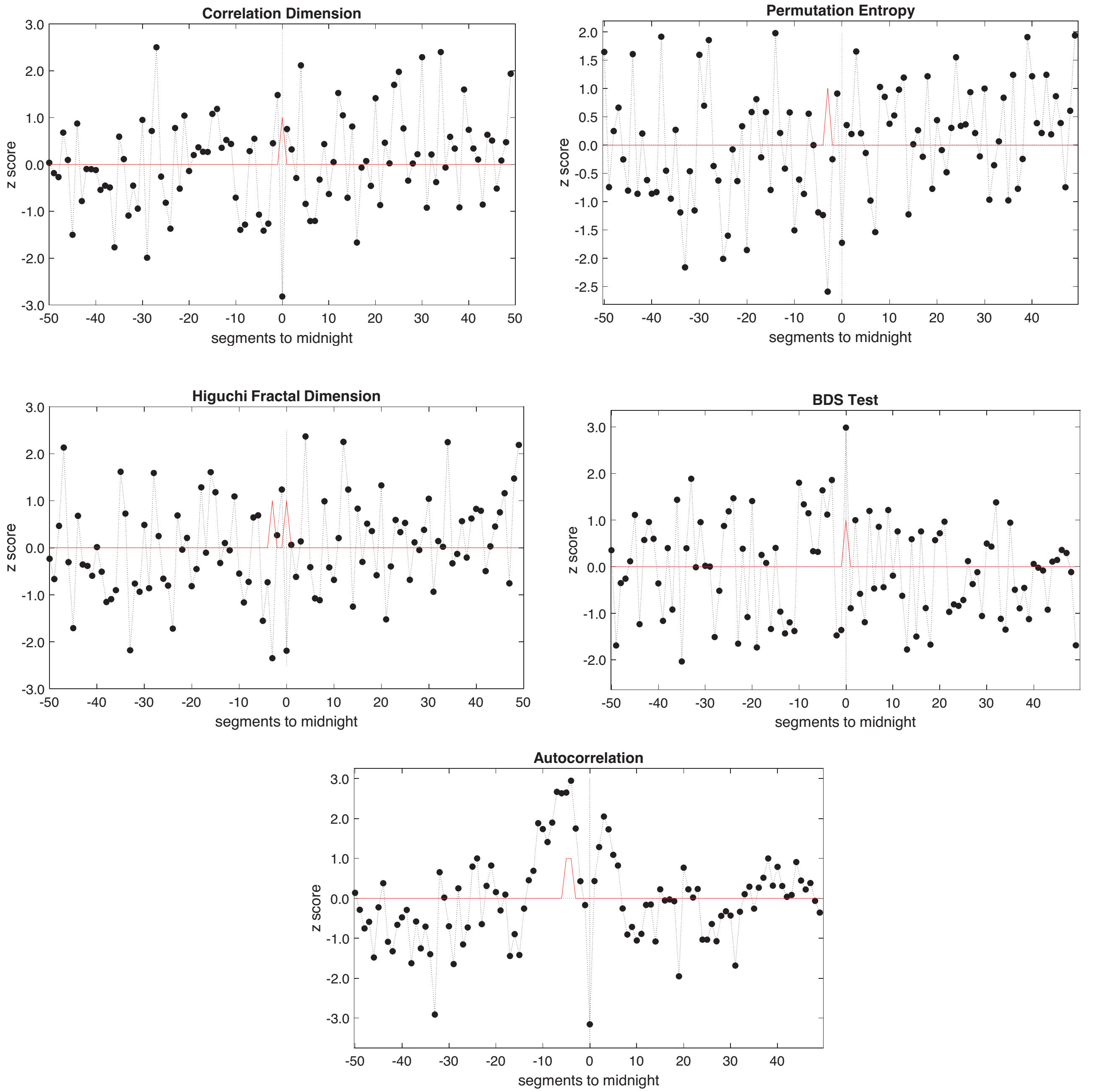

Figure 4. Statistical results for analysis of the original z score array using correlation dimension (CD), permutation entropy (PE), Higuchi fractal dimension (HFD), the BDS test and an autocorrelation test (AC), in each case as compared to 5,000 randomized permutations. The notches (red lines) indicate a significant deviation at $p < 0.05$ (one-tailed, according to a prediction that the random time series will become more ordered) adjusted with False Discovery Rate from 3 minutes before to 3 minutes after midnight.

year-by-year basis, but as in all of the GCP results the absolute magnitude observed for any one event is miniscule. However, if the deviations tend to go in the same direction, they could become statistically unambiguous after combining the data over many repeated events. The analytical approach is thus similar to the use of hundreds of repeated stimuli required to observe a clear event-related potential in brain activity.

Alternative Explanations

Four classes of explanations have been proposed to account for the statistically significant results observed in the GCP experiment, and in many earlier "field consciousness" experiments (Mason et al., 2007; Nelson et al., 2007; Radin, 1997; Radin & Atwater, 2009). These are chance, experimenter effects, goal-oriented effects, and a

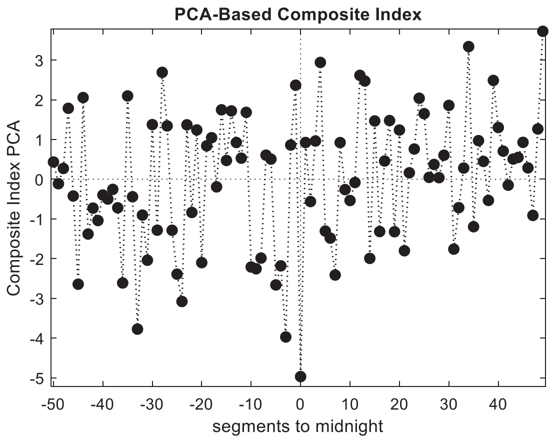

Figure 5. Principal Components Analysis normalized composite index. In one hundred 36-second segments, the segment at midnight is associated with $z = -4.9$, $p = 4.8 \times 10^{-7}$.

negentropic field effect.

Chance

Some of the earlier field consciousness experiments, which were performed in smaller groups engaged in meditations, choral performances, sacred sites, or during live TV broadcasts like the opening ceremony of the Olympics, were exploratory and may not have prespecified the methods of analysis. As such, it is possible that some of those reported outcomes were false positives. However, the GCP experiment did use a predefined method of analysis over its formal series of 500 world events, as well as a protocol that required the events to be defined before the data were examined, and that study achieved a 7.3 sigma deviation from chance (Nelson, 2017). That is so far from chance expectation that "fluke" is not a viable explanation, and because the earlier studies were conceptually similar to the GCP design, it suggests that the results reported in many of those studies were likely to also be valid.

Experimenter Effects

This idea proposes that the events selected to be compared against the random time-series data are chosen by the investigators based on their intuitive sense that those events will deviate from chance. Such deviations are viewed as a consequence of expected variations in truly random walks, rather than due to externally imposed influences (Bancel, 2017; May et al., 1995). In events that involve unanticipated incidents of uncertain lengths, and where decisions are made whether to include or exclude such events, this explanation – which differs from chance because these events are selected before the data are examined – is difficult to exclude because the selection process entails large degrees of freedom by investigators, which may in turn increase the statistical likelihood of a false positive. Thus, this explanation is sometimes called an "experimenter psi effect," because it would require knowing something about the outcome of a decision before any conventional information is available (Kennedy & Taddonio, 1976).

In the present case, New Years Eve was selected as the event of interest, but after that one decision the range of other possible decisions was constrained because that event occurs repeatedly and predictably only at certain moments and dates. In addition, the method of analysis selected to analyze the data was based on a simple shift of the mean, then smoothed by a 3-minute moving mean to provide a low-pass filter to better match variations in human attention. As noted in Figure 7, if other smoothing windows had been selected, they would have produced essentially the same results. So the present outcome does not appear to be an experimenter psi effect.

Goal-Orientation

This explanation is similar to experimenter effects in that it assumes that collective consciousness does not *causally* influence the random data, in the sense of Aristotle's "efficient cause." That type of cause is related to conventional physical forces that bring about an effect, like billiard balls bounding off each other on a pool table. Instead, goal-orientation refers to a teleological phenomenon, that is, to *purpose*, which in present context is most likely the investigator's goal of gathering evidence for a potential mind-matter interaction effect (Schmidt, 1987), rather than attributing any type of goal to the RNGs.

While science usually only considers efficient cause as the way to explain effects, Aristotle other identified "final cause," which refers to *telos* or the purpose of an effect. E.g., the telos of an acorn is to become an oak tree; the telos of a caterpillar is to become a butterfly. Final cause may be relevant in the present context because for many natural processes, especially those in living systems, the future state of a system is a crucial element in understanding the causal mechanism because the *why* can often be identified by looking not only at *what* initiates change, but also the *purpose* that motivates that process in the first place.

But how could goal-orientation explain the GCP results? A possible analog is the Principle of Least Action

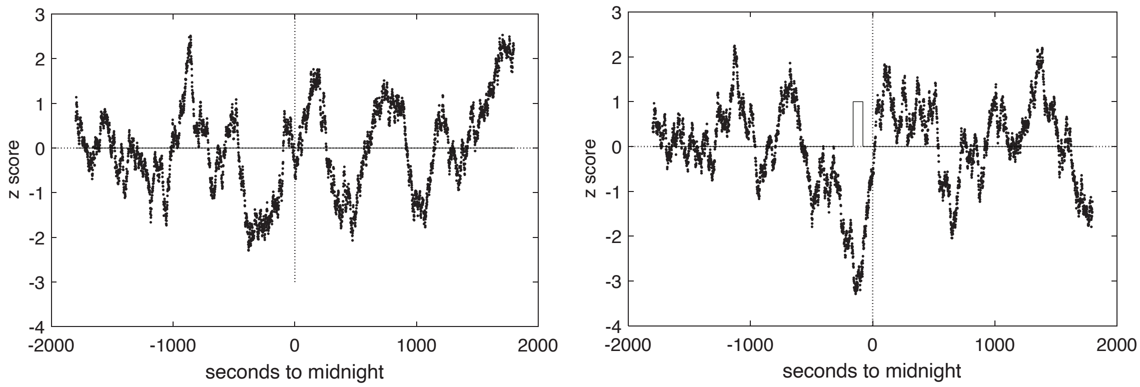

Figure 6. (Left) Twelve low population time zones with a combined estimate of 629 million people. There were no significant deviations after adjustment with False Discovery Rate. (Right). Twelve high population time zones, including UTC –5, –4, 0, +1 through +5, +5.5 for India, and +6 to +9, with a combined estimate of 6.8 billion people. A significant deviation at $p < 0.05$ (one tailed) is indicated before midnight.

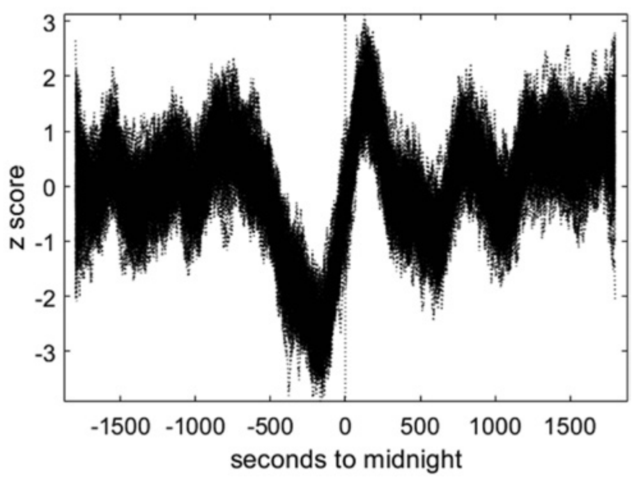

Figure 7. Test of the role of time synchronization of the RNGs in the GCP network by circular shifting each RNG's daily timestamps from –60 to +60 seconds, then recalculating the original analysis. This procedure was repeated 100 times, and all curves are shown, indicating that the general shape of the New Years Eve effect remains even if each RNG's timing was off by ± 1 minute.

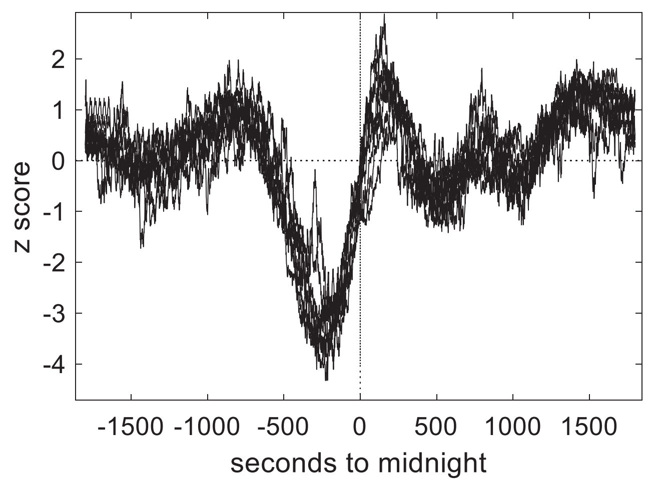

Figure 8. Mean-shift analysis for smoothing windows from 2 to 10 seconds in length, showing similar results regardless of window size.

(PLA, Terekhovich, 2018), a principle that underlies both classical and quantum mechanics. The PLA states that a physical system will follow the path between an initial and a final state that minimizes the total expended energy. That path can appear to be goal-oriented because unless something intervenes, the system will always "choose" the optimal path. This seems like a goal-oriented effect because it requires specifying not just where the system begins, but also where it ends, thus involving its final state.

From a modern perspective, the PLA is not interpreted as the inanimate physical *intending* to do anything. It just satisfies a set of mathematical equations that create an optimal path, which is in turn constrained by initial and final boundary conditions. Still, this fundamental concept in mathematics is remarkably similar to purpose in biology, as discussed perhaps most famously by physicist John Wheeler in his concept of a "participatory universe." Wheeler's ideas suggest the possibility that there is a PLA-like effect whereby human purpose might play a key role in the behavior of physical world (Wheeler, 1990).

Another way to imagine goal-orientation is or as a system that remains in superposition and that "collapses" from a potential state to an actual state only upon observation. This "Observational Theory" proposes that a motivated observer can intentionally influence probabilistic events at the quantum scale (Houtkooper, 2002; Walker, 1979, 1982). Supporting this idea are nearly four dozen experiments reported from 1975 to 2021, all using prerecorded but unobserved random bits produced by an

RNG (Schmidt, 1976, 1987). Future assignments of intentions given to test participants to achieve more 0s or 1s in this data when it was played back, and thus observed, revealed that the data conformed to those assignments with an overall statistical assessment associated with $p = 5 \times 10^{-12}$ (Williams, 2021).

Negentropic Field Effect

A fourth idea is that whatever else consciousness may be, it appears to act like a principle, or negentropic field, that injects order into physical systems. As noted by Schrödinger (Schrödinger & Penrose, 2012) living systems survive entropic decay by "eating" negentropy. Similar reversals of entropy can be found in self-organizing fluids or certain supersaturated solutions, where despite an overall increase in entropy, as heat flows from hot to cold localized patterns of order can emerge. Such processes do not violate global entropy, but under the right conditions they can reverse entropy and give rise to local order by guiding ambient energies into structure.

A related idea involves dissipative structures in far-from-equilibrium systems (Prigogine, 1997). Such systems, like tornadoes or whirlpools, remain in highly ordered states due to a continual flux of energy and matter. They maintain local order while increasing the overall entropy of the environment. Collective consciousness viewed as a distributed "dissipative structure" might likewise guide ambient energies, including those in RNGs, to create stable negentropic patterns. In general, by viewing individual consciousness as a negentropic field that creates subjective coherence in the brain by drawing upon bodily energy, collective consciousness may be similarly viewed as a distributed form of coherence that creates physical coherence in the environment by drawing upon ambient energies, which upon release of that coherence is then released back into the environment. This might explain, at least as an analogy, why the New Years Eve curve drops before the stroke of midnight as collective mental coherence builds with anticipation and then "rebounds" after midnight upon release of that coherence.

A Metaphysical Roundtable

Well accepted physical mechanisms do not appear to adequately explain the New Years Eve effect, leading to understandable doubts. Common criticisms assert that the present results must be due to design or statistical flaws, or that it is justifiable to ignore the evidence altogether because it is literally impossible (Reber & Alcock, 2020). However, it is well known that evaluation of data is biased by one's *a priori* theoretical perspectives (Lee et al., 2013; Mahoney, 1977; Peters & Ceci, 1982), thus a case can be made that dismissive critiques are based on an uncritical acceptance of prevailing theories, rather than a careful examination of the empirical data.

As a simple example, if one assumed that materialistic concepts were the only viable way to understand reality, then consciousness must be solely dependent on brain activity. And then, given the results from hyper-scanning studies in social neuroscience, which shows that people engaged in similar tasks exhibit similar brain states (Carollo & Esposito, 2024), one might propose that the billions of brains anticipating New Years Eve caused the deviations observed in RNG outputs via interference from brain-related electromagnetic effects. For example, one could argue that the average brain is said to consume about 20 watts of power (Raichle & Gusnard, 2002), so a billion brains would represent 20 gigawatts, which sounds impressive except that nearly all of that would be metabolic energy consumption, and not radiated electromagnetic power. Indeed, the latter has been estimated to be about 1 femtowatt per brain (Buzsáki et al., 2012), and thus the total power emitted from a billion brains would be around one microwatt. That would not be sufficient to influence the electronic noise within a single RNG, even if a brain were somehow located right next to it (and note that this counterargument also sidesteps the effects of the XOR logic, which scrambles the noise source).

A more intriguing alternative is that the materialistic doctrine that has guided science for several centuries has been outstandingly successful, but it is inadequate when it comes to the nature of consciousness, as a growing cadre of thought leaders are now openly proposing. For example, consider neuroscientist Christof Koch, a protégé of Francis Crick who had famously quipped, "You're nothing but a pack of neurons" in the prologue of Crick's book, *The Astonishing Hypothesis* (Crick, 1996). The astonishing idea was that "you" are literally your brain, full stop. Koch too was an advocate of that idea, but he evolved beyond Crick's position and expressed a radically different opinion in 2024, writing:

> The wheel is turning back to much more ancient understandings of experience, including idealism, the proposition that ultimately even matter and energy are mental manifestations, and panpsychism, the school of thought that

> all creatures, and perhaps even matter itself, are ensouled, that it feels-like-something to be anything, not just a human or even a bat. Modern science is supporting aspects of this remarkable turn of events (Koch, 2024).

The wheel turning back in the neurosciences echoes a similar resurrection across many disciplines (Gao, 2022; Goff, 2024; Kuhn, 2024; Lewton, 2022), including physics. As historian Juan Miguel Marin wrote in reviewing the largely forgotten origins of quantum theory:

> Not only was consciousness introduced hypothetically at the birth of quantum physics, but the term "mystical" was also used by its founders to argue in favour and against such an introduction. In private conversations, at least as early as the 1927 Solvay Congress, the founders discussed ideas about quantum theory, mysticism and consciousness (Marin, 2009).

Those founders included a parade of the most foremost physicists of the 20th century – figures such as Bohr, Eddington, Jordan, Planck, Pauli, Heisenberg, Schrödinger, Jeans, London, Wigner, Wheeler, and von Neumann (Wilber, 1984). Physicists today might argue that citing such luminaries is invalid because it is an argument by authority. But as noted, the metaphysical wheel in science is turning, thus reexamining the thoughts of those leading lights in light of the present analysis is well justified.

To do this, imagine a roundtable where we presented these scientists with the results of this New Years Eve analysis, and then we invited their comments, which are presented here not as quotes, but with artistic license based directly upon their published works. Planck (1931) might have said something like this:

> From the earliest days of quantum theory, I've insisted that mind is the matrix from which reality emerges. The subtle fluctuations you observed in random data—coincident with collective human attention—remind us that the world is not composed of inert, mindless particles. Your findings suggest that mass emotional or mental focus can nudge the tapestry of quantum events. To me, this is only natural if consciousness does not stand outside the physical world but is instead part of the very medium of existence.

Schrödinger (1961) might have replied,

> When I formulated the wave equation, I already suspected that the division between observer and observed was simply a convenience. These GCP results make sense to me because they appear to highlight an entangled unity among countless human observers and the physical world. If each consciousness merges into what I've called the *One Mind*, then at a moment of collective celebration we should not be surprised that so-called "random" physical events would reflect that unity.

Eddington (1928) might add,

> I have proposed that our picture of the external world is an outcome of our own mental constructs. So-called physical reality is but a shadow cast by the mind on the screen of perception. If the GCP's RNGs recorded consistent deviations aligned with large-scale focusing of human attention, it would affirm my insight that our minds do not simply *witness* a separate universe. Rather, they participate in its ongoing creation.

At this point, Wheeler (1994) might have jumped in and said,

> The deviations observed in the GCP random data might be glimpses of what I've called 'the participatory universe.' In fact, I wouldn't be surprised if future generations interpreted these data as evidence that the universe is continuously in conversation with observers, which might include human consciousness as one special type of observation.

Heisenberg (1958) might have mused that global consciousness "sharpened" the uncertainty in RNG outputs, in which case when the global mind becomes more coherent, then random physical systems would have less freedom to wander, which might be detected statistically as the result observed in the GCP's New Years Eve data. Similarly, Pauli (1994) might have wondered if correlations observed in random data streams reflected a form of global synchronicity, with the psyche's "hidden hand" revealing itself when billions of minds aligned around a shared emotional event. Wigner & Margenau (1967) too might have referred to his famous thought experiment, known as Wigner's Friend, where in the present case there was not just one friend, but billions, making it possible for subtle observer effects to become more clearly visible in "random" data.

Time will tell if such a fanciful roundtable discussion arises in the future as the wheel of assumptions about the nature of reality continues to evolve and revolve.

REFERENCES

Atmanspacher, H., & Rickles, D. (2022). *Dual-aspect monism and the deep structure of meaning*. Routledge. https://doi.org/10.4324/9781003270584

Bancel, P. A. (2017). Searching for global consciousness: A 17-year exploration. *EXPLORE*, *13*(2), 94–101. https://doi.org/10.1016/j.explore.2016.12.003

Bancel, P., & Nelson, R. (2008). The GCP event experiment: Design, analytical methods, results. *Journal of Scientific Exploration*, *22*(3), 309–333.

Bandt, C., & Pompe, B. (2002). Permutation entropy: A natural complexity measure for time series. *Physical Review Letters*, *88*(17), 174102. https://doi.org/10.1103/PhysRevLett.88.174102

Bösch, H., Steinkamp, F., & Boller, E. (2006). Examining psychokinesis: The interaction of human intention with random number generators—A meta-analysis. *Psychological Bulletin*, *132*(4), 497–523. https://psycnet.apa.org/doi/10.1037/0033-2909.132.4.497

Brock, W. A., Scheinkman, J. A., Dechert, W. D., & LeBaron, B. (1996). A test for independence based on the correlation dimension. *Econometric Reviews*, *15*(3), 197–235. https://doi.org/10.1080/07474939608800353

Buzsáki, G., Anastassiou, C. A., & Koch, C. (2012). The origin of extracellular fields and currents—EEG, ECoG, LFP and spikes. *Nature Reviews Neuroscience*, *13*(6), 407–420. https://doi.org/10.1038/nrn3241

Carollo, A., & Esposito, G. (2024). Hyperscanning literature after two decades of neuroscientific research: A scientometric review. *Neuroscience*, *551*, 345–354. https://doi.org/10.1016/j.neuroscience.2024.05.045

Crick, F. (1996). The astonishing hypothesis: The scientific search for the soul. *The Journal of Nervous and Mental Disease*, *184*(6), 384. https://doi.org/10.1097/00005053-199606000-00013

Eddington, A. (1928). *The nature of the physical world.* Cambridge University Press. https://doi.org/10.5962/bhl.title.5859

Gao S (Ed.). (2022). *Consciousness and quantum mechanics*. Oxford University Press. https://doi.org/10.1093/oso/9780197501665.001.0001

Global Consciousness Project 2.0. (n.d.). Demystifying interconnectivity and global consciousness so humanity can thrive. Retrieved October 24, 2025, from https://gcp2.net/

Goff, P. (2024). *Why the mystery of consciousness is deeper than we thought*. Scientific American. https://www.scientificamerican.com/article/the-mystery-of-consciousness-is-deeper-than-we-thought/

Grassberger, P., & Procaccia, I. (1983). Measuring the strangeness of strange attractors. *Physica D: Nonlinear Phenomena*, *9*(1–2), 189–208. https://doi.org/10.1016/0167-2789(83)90298-1

Heisenberg, W. (1958). *Physics and philosophy: The revolution in modern science.* Harper & Row.

Higuchi, T. (1988). Approach to an irregular time series on the basis of the fractal theory. *Physica D: Nonlinear Phenomena*, *31*(2), 277–283. https://doi.org/10.1016/0167-2789(88)90081-4

Houtkooper, J. M. (2002). Arguing for an observational theory of paranormal phenomena. *Journal of Scientific Exploration*, *16*(2), 171–185.

Information Technology Laboratory: Computer Security Resource Center. (2016, May 24). *NIST SP 800-22: Download documentation and software – Random bit generation*. CSRC, NIST. https://csrc.nist.gov/Projects/Random-Bit-Generation/Documentation-and-Software

Jahn, R. G., Dunne, B. J., Nelson, R. G., Dobyns, Y. H., & Bradish, G. J. (2007). Correlations of random binary sequences with pre-stated operator intention: A review of a 12-year program. *Explore*, *3*(3), 244–253, 341–343. https://doi.org/10.1016/j.explore.2007.03.009

Kennedy, J. E., & Taddonio, J. L. (1976). Experimenter effects in parapsychological research. *Journal of Parapsychology*, *40*(1), 1–33.

Koch, C. (2024). *Then I Am Myself the World: What consciousness is and how to expand it*. Basic Books.

Kuhn, R. L. (2024). A landscape of consciousness: Toward a taxonomy of explanations and implications. *Progress in Biophysics and Molecular Biology*, *190*, 28–169. https://doi.org/10.1016/j.pbiomolbio.2023.12.003

Lee, C. J., Sugimoto, C. R., Zhang, G., & Cronin, B. (2013). Bias in peer review. *Journal of the American Society for Information Science and Technology*, *64*(1), 2–17. https://doi.org/10.1002/asi.22784

Lewton, T. (2022). *A new place for consciousness in our understanding of the universe*. New Scientist. https://www.newscientist.com/article/0-a-new-place-for-consciousness-in-our-understanding-of-the-universe/

Mahoney, M. J. (1977). Publication prejudices: An experimental study of confirmatory bias in the peer review system. *Cognitive Therapy and Research*, *1*(2), 161–175. https://doi.org/10.1007/BF01173636

Marin, J. M. (2009). 'Mysticism' in quantum mechanics: The forgotten controversy. *European Journal of Physics*, *30*(4), 807–822. https://doi.org/10.1088/0143-0807/30/4/014

Mason, L. I., Patterson, R. P., & Radin, D. (2007). Exploratory study: The random number generator and group meditation. *Journal of Scientific Exploration*, *21*(2), 295–317.

May, E. C., Utts, J. M., & Spottiswoode, S. J. P. (1995). Decision augmentation theory: Toward a model of anomalous mental phenomena. *Journal of Parapsychology*, *59*(3), 195–220.

Nelson, R. (2017). Weighting the parameters, a response to Bancel's "Searching for Global Consciousness: A seventeen year exploration", *EXPLORE*, *13*(2), 102–105, https://doi.org/10.1016/j.explore.2016.12.002.

Nelson, R., & Bancel, P. (2011). Effects of mass consciousness: Changes in random data during global events. *Explore*, *7*(6), 373–383. https://doi.org/10.1016/j.explore.2011.08.003

Nelson, R. D., Radin, D. I., Shoup, R., & Bancel, P. (2002). Correlations of continuous random data with major world events. *Foundations of Physics Letters*, *15*(6), 537–550. https://doi.org/10.1023/A:1023981519179

Nelson, R. D., Jahn, R. G., Dunne, B. J., Dobyns, Y. H., & Bradish, G. J. (2007). FieldREG II: Consciousness field effects: Replications and explorations. *Explore*, *3*(3), 279–293. https://doi.org/10.1016/j.explore.2007.03.020

Pauli, W. (1994). Wolfgang Pauli (1900–1958). In C. P. Enz & K. von Meyenn (Eds.), *Writings on physics and philosophy* (pp. 13–26). Springer. https://doi.org/10.1007/978-3-662-02994-7_2

Peters, D. P., & Ceci, S. J. (1982). Peer-review practices of psychological journals: The fate of published articles, submitted again. *Behavioral and Brain Sciences*, *5*(2), 187–195. https://doi.org/10.1017/S0140525X00011183

Planck, M. (1931). *The universe in the light of modern physics.* George Allen & Unwin.

Price, P. J. (1992). CHAPTER 12—Electron tunneling in semiconductors. In P. T. Landsberg (Ed.), *Basic properties of semiconductors* (pp. 627–664). Elsevier. https://doi.org/10.1016/B978-0-444-88855-6.50020-6

Prigogine, I. (1997). *The end of certainty* (F First Edition). Free Press.

Radin, D. I. (1997). *The conscious universe*. HarperOne.

Radin, D., & Nelson, R. (1989). Evidence for consciousness-related anomalies in random physical systems. *Foundation of Physics*, *19*, 1499–1514. https://doi.org/10.1007/BF00732509

Radin, D., Nelson, R., Dobyns, Y., & Houtkooper, J. (2006). Reexamining psychokinesis: Comment on Bösch, Steinkamp, and Boller (2006). *Psychological Bulletin*, *132*(4), 529–537. https://doi.org/10.1037/0033-2909.132.4.529

Radin, D. I., & Atwater, F. H. (2009). Exploratory evidence for correlations between entrained mental coherence and random physical systems. *Journal of Scientific Exploration*, *23*(3), 1–10.

Raichle, M. E., & Gusnard, D. A. (2002). Appraising the brain's energy budget. *Proceedings of the National Academy of Sciences of the United States of America*, *99*(16), 10237–10239. https://doi.org/10.1073/pnas.172399499

Reber, A. S., & Alcock, J. E. (2020). Searching for the impossible: Parapsychology's elusive quest. *American Psychologist*, *75*(3), 391–399. https://doi.org/10.1037/amp0000486

Schmidt, H. (1976). PK effect on pre-recorded targets. *Journal of the American Society for Psychical Research*, *70*(3), 267–291.

Schmidt, H. (1987). The strange properties of psychokinesis. *Journal of Scientifc Exploration*, *1*(2), 103–118.

Schrödinger, E. (1961). *My view of the world.* Cambridge University Press.

Schrödinger, E., & Penrose, R. (2012). *What is Life? With mind and matter and autobiographical sketches (Canto Classics)*. Cambridge University Press. https://doi.org/10.1017/CBO9781107295629

Terekhovich, V. (2018). Metaphysics of the principle of least action. *Studies in History and Philosophy of Science Part B: Studies in History and Philosophy of Modern Physics*, *62*, 189–201. https://doi.org/10.1016/j.shpsb.2017.09.004

Wald, A., & Wolfowitz, J. (1940). On a test whether two samples are from the same population. *The Annals of Mathematical Statistics*, *11*(2), 147–162. https://doi.org/10.1214/aoms/1177731909

Walker, E. H. (1979). The quantum theory of psi phenomena. *Psychoenergetic Systems*, *3*, 259–299.

Walker, E. H. (1982). Quantum mechanics and consciousness. *Journal of Indian Psychology*, *4*(2), 21–26.

Wheeler, J. A. (1990). Information, physics, quantum: The search for links. In W. Zurek (Ed.), *Complexity, Entropy, and the Physics of Information* (309–336). Addison-Wesley.

Wheeler, J. A. (1994). *At home in the universe.* American Institute of Physics Press.

Wigner, E., & Margenau, H. (1967). Symmetries and reflections, scientific essays. *American Journal of Physics*, *35*, 1169–1170. https://doi.org/10.1119/1.1973829

Wilber, K. (1984). *Quantum questions: Mystical writings of the world's great physicists*. Shambhala.

Williams, B. J. (2021). Minding the matter of psychokinesis: A review of proof- and process-oriented experimental findings related to mental influence on random number generators. *Journal of Scientific Exploration*, *35*(4), 829–932. https://doi.org/10.31275/20212359