EGG Anomalies -
Comments on the GCP EGG data for September 11, 2001

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Abstract: Analysis and interpretation of random number streams can be problematic and contentious as attested by the two somewhat differing reports by Radin and by May and Spottiswoode concerning the GCP EGGs with regard to September 11, 2001. Our analysis lies somewhere in between these two. We find that something quite unusual did happen in the RNG network on September 11, and discuss anomalies at three different time scales. Especially interesting is a significant correlation among the RNGs which seems to have occurred uniquely on September 11. These anomalies are provocative and may support hypotheses other than global conciousness. Further investigation is strongly urged.[1]

"*The way to do research is to attack the facts at the point of greatest astonishment.*" -- Celia Green

"*I believe in an open mind, but not so open that your brains fall out.*" -- Arthur Hays Sulzberger

Introduction

We will assume familiarity with the general principles of Random Number Generators (RNGs or the GCP "EGGs"), the Global Consciousness Project and report by Nelson on the events of September 11, and the Radin and the May and Spottiswoode reports on this subject.[2] Note this is an informal report on work in progress whose sole purpose is to stimulate further discussion and analyses of these phenomena. Formal publication may be warranted eventually, but these investigations should be considered at a preliminary stage at this time.

It is most important, essential, to clearly separate *the data* and analyses of it, from *the hypotheses* about how any observed anomalies might be explained, from *speculation* about what it all might mean. Three distinct questions can, and should, be asked:

1. Did something really extra-chance happen in the EGGs on September 11?
2. If so, how can this be explained?
3. If so, what could be the implications?

Only the first of these questions will be dealt with at length in this report.

[1] This report was formerly titled "EGG Salad", but some readers did not recognize this title as a bit of informal self-deprecation rather than a lack of seriousness in the research.
[2] See www.boundaryinstitute.org/randomness.htm for links to these reports.

Did something really extra-chance happen in the EGGs on Sep. 11?

Bottom line: Yes.

There are at least three anomalies at different time scales which can be observed in the data for September 11. Note that all times given here are in Universal Time (UTC), which on September 11 was 4 hours ahead of Eastern Daylight Time (EDT). The terrorist attacks in New York City and Washington D.C. occurred between 12:45 and 14:30 UTC (8:45 and 10:30 EDT).

1. A one-second large deviation at 14:12:46 UTC (10:12:46 EDT)

This deviation was found by Radin as well, and was also discussed in the May and Spottiswoode report. If we compute the largest per-second Z score for each day in July through October, the result is Figure 1. This chart shows how often by chance alone a per-second Z score as large as the maximum for each day would be seen, on a logarithmic scale.

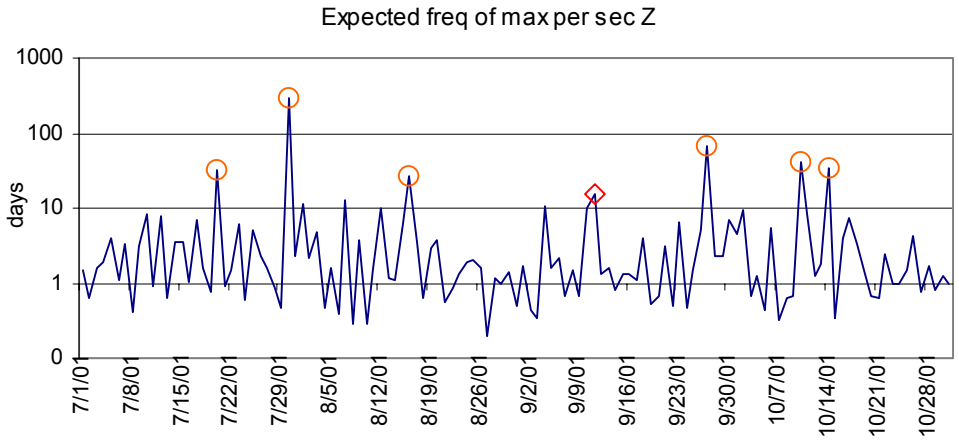

Figure 1. Expected frequency of the maximum per-second Z for each day

As May and Spotiswoode observed, the large value on September 11 is unusual (Z = 4.81, odds of more than 1.3M to 1), but on a per-second basis this should occur about once in every 15 days. Indeed, in the actual data we can see several other larger one-second peaks on July 20 (31 days), July 30 (288 days), August 16 (27 days), September 27 (15 days), October 10 (40 days), and October 14 (35 days), all more or less as expected by chance.

It could be argued that, since this spike occurred in the middle of the ~2-hour window of the terrorist attacks on September 11, such an event should occur *on a daily basis* only

once in about 15*(24/2) = 180 days, but this seems to be somewhat spurious post-hoc reasoning.

2. A large several-minute increase in variance around 9:30 UTC

As discussed by Radin, computation of the maximum χ^2 (chi squared) statistic for each day reveals a disparate value for September 11. A sliding window (low-pass box filter) of varying width is used to remove high frequency deviations. Figure 2 shows these results for window widths of 1 to 6 hours, with odds against chance displayed on a logarithmic scale.[3]

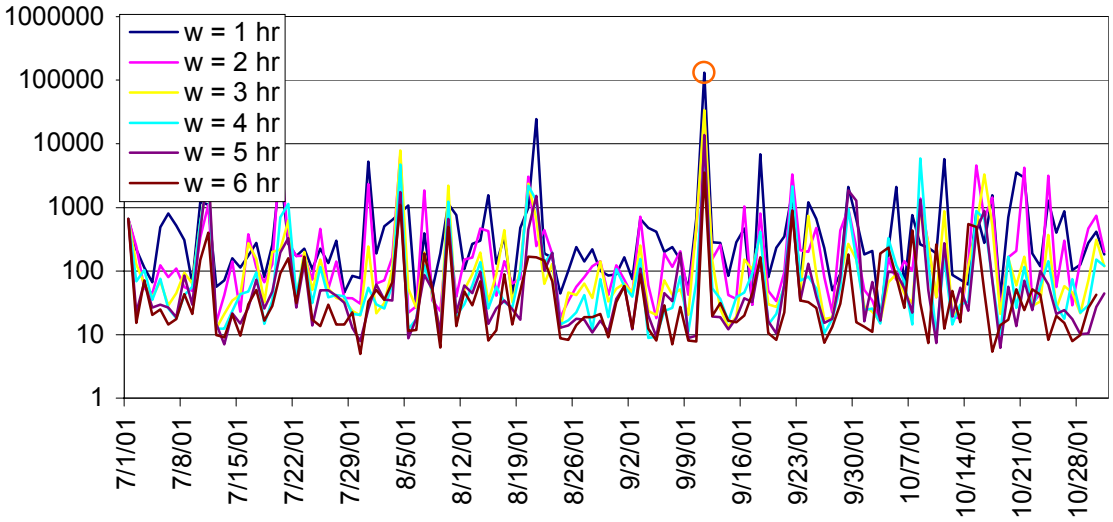

Figure 2. Odds of max daily χ^2, Jul-Oct 2001

The largest peak by far in this four-month period occurs on September 11, with odds of over 131,000 to 1 computed for a filter width of 1 hour. In fact, all sliding window widths examined from about 45 minutes to over 8 hours have their maximum on September 11 beginning near 9:30 UTC -- several hours prior to the events of that day. Results computed for two of these widths are also shown in Figure 3 on a linear odds scale for emphasis.

This single day September 11 can be uniquely and readily distinguished by statistical variance of the RNGs from any other day in this four-month period.

[3] The χ^2 computation here is essentially the same as that described by Radin except that no intermediate 5-min consolidation is used, and only EGGs reporting 80% or more of the day are included. The Nelson χ^2 computation is similar, but different in an important way, see the GCP report.

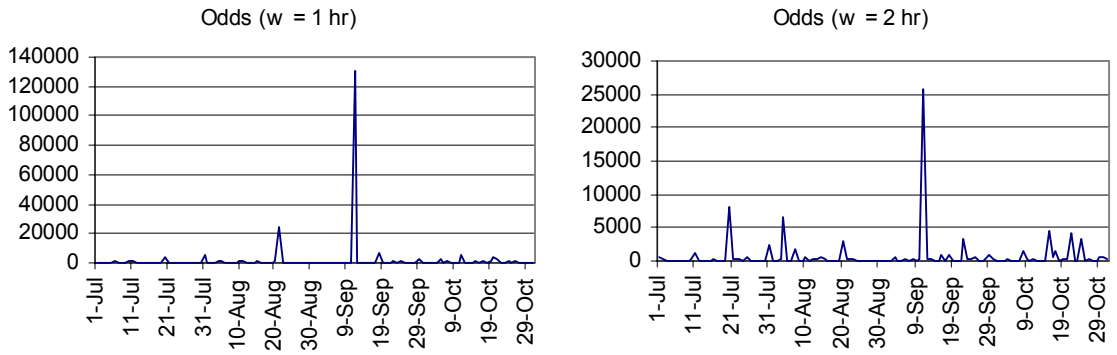

Figure 3. Odds of max daily χ^2, Jul-Oct 2001, two filter widths

3. A large correlated increase in variance across many generators beginning around 8:00 UTC and lasting more than 4 hours

For this purpose, the EGGs have been divided into two groups in several different ways. The graphs of cumulative χ^2 for September 11 (Figure 4) show a marked increase in variance beginning around 8:00 UTC and a strong correlation which continues for the entire day.[4,5]

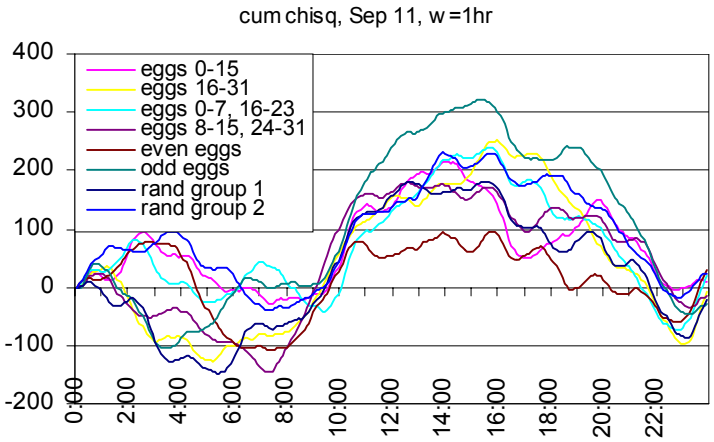

Figure 4. Cumulative χ^2 for various EGG groupings on September 11.

[4] Details of this computation are available upon request from the author, and EGG data itself may be freely downloaded from the GCP web site noosphere.princeton.edu. The graph shown here is similar to Nelson's Figure http://noosphere.princeton.edu/images/images2/terror010911vp2.gif and Radin's Figure 5.

[5] Since the cumulative sum begins at 0:00 each day, there is an abitrary vertical offset present in all the cumulative graphs. Note also the trailing window time has been plotted here, 1/2 hour after the center of the average. A more formal computation of correlation has been done by Bancel, see the GCP report.

Figure 5 below shows two such complementary sets displayed separately for clarity. Note the strong upward trend in both groupings between approximately 8:00 and 12:00, the correlation thereafter except for magnitude, and the *lack* of correlation prior to 8:00.

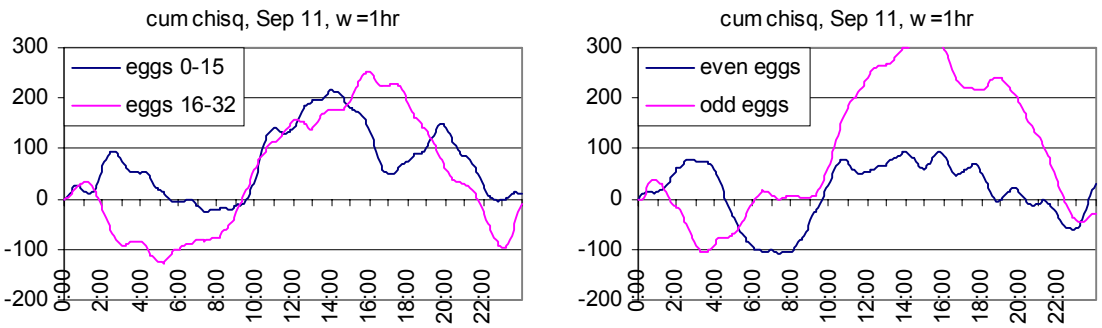

Figure 5. Cumulative χ^2 for two EGG groupings on Sep 11.

For comparison, Figure 6 below shows two other days, August 11 and September 10. Little or no correlation is seen on these days (nor on any other days which have been analyzed in this way so far). Note also that the magnitude of the sums on these days are much smaller than on September 11, indicating a smaller overall deviation from chance.

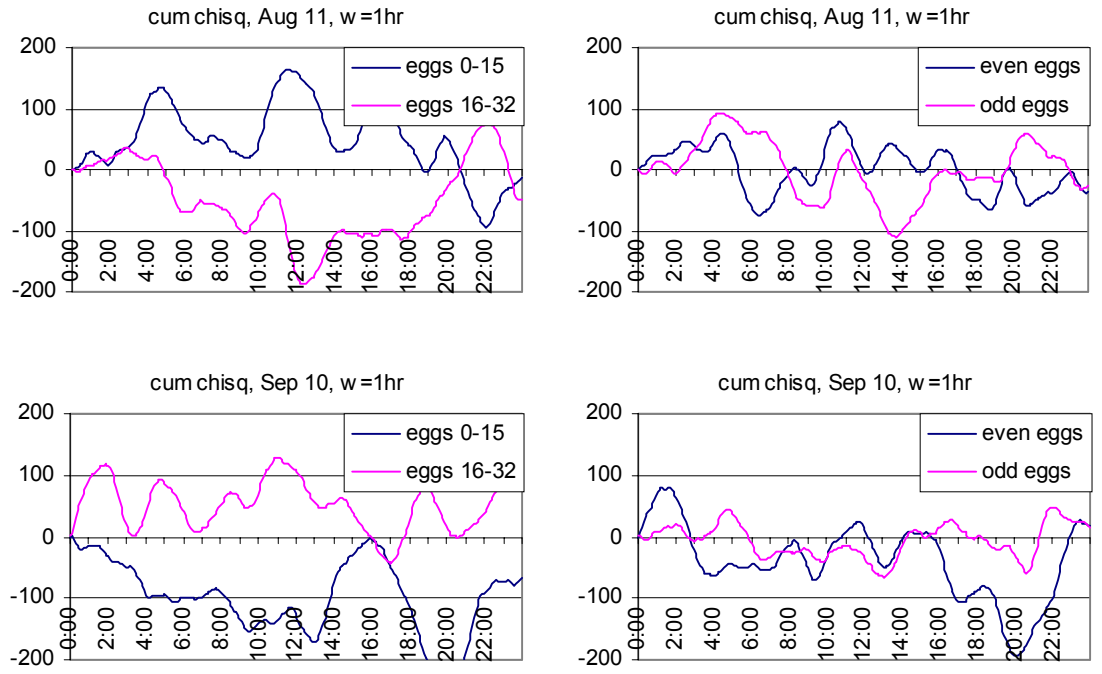

Figure 6. Cumulative χ^2 for EGG groups on August 11 and September 10

It must be emphasized that the above analyses are simple and straighforward applications of standard statistical techniques. No significant searching was necessary to find these anomalies, nor were any parameters finely tuned to select out the data of September 11 from other days. In our view, the lamentations of May and Spottiswoode regarding *post hoc* and lucky or fortuitous choices in analysis, while sincere, are misplaced and unfair in this case, especially with respect to *inter*-day analysis presented here and in Radin, which they do not address at all.

Also, not all of science is hypothesis testing. There is nothing improper about *post hoc* analysis of data so long as newly-generated hypotheses are not applied to the same data. We have also examined various groupings of the EGGs in this case sufficiently to answer the May and Spottiswoode concern regarding subsets of the EGGs, at least for the present analyses. In particular, the correlations discussed above seem to be present throughout most of the EGGs.

It would be useful to use the analyses done on these data to generate hypotheses for use on EGG data in the future. However, we hope that no further calamities of the magnitude of September 11 transpire to test them. In addition to further investigation of the GCP EGG data, we should now focus on small-scale laboratory or other experiments with RNGs to further explore these phenomena.

If something extra-chance happened in the EGG network on September 11, how can this be explained?

While one can easily lie *with* statistics, the statistics themselves are just mathematics. The above are simple algebraic facts derived by calculation from the data, *but* they can, of course, be provisionally explained, interpreted, and assigned meaning in various ways.

Hypotheses about the physical mechanism which might be responsible for the effects seen in the network of random number generators on September 11 will be the subject of another report. However, briefly, there are at least three classes of possible explanation:

1. Global Consciousness - Our minds are not entirely contained within our brains, and somehow the combined effects of many people thinking similar thoughts causes changes in the fundamental parameters of physical devices. In our view, this hypothesis is somewhat vague, not physically grounded, and only somewhat supports the extant data. Nevertheless, it is a courageous and useful starting point from which we may generate more specific and testable hypotheses.[6]

[6] Of course, we are all indebted to the Global Consciousness Project for setting up this network and generously providing the data and support necessary to conduct these investigations in the first place.

2. Field Effect - Some known or unknown field is generated or affected by the events of September 11 and this field in turn affects the fundamental randomness of certain devices all over the world. This hypothesis appears to require major departures from existing physics, and does not address the "selectivity problem": How is it that these generators are affected and (apparently) not other random processes?

3. Backwards Causality - RNGs are not solely output devices, but are affected backwards in time from observers and other events to which they are connected. Both classical and quantum physics are (almost entirely) time-symmetrical, thus allowing small effects to propagate backwards in time.[7] This hypothesis is not necessarily in any conflict with existing physics, and deals well with the selectivity problem.

Clearly, further research is necessary to formulate and test more specific hypotheses concerning the behavior of these random devices under certain special conditions. It is still possible than some simple or complex prosaic explanation can account for the behavior of the EGGs on September 11.

If something extra-chance happened in the EGG network on September 11, what could be the implications?

It is also beyond the scope of this report to speculate much about the meaning or implications of the above data. Suffice it to say that if the phenomenon implied here are what they seem, then the assumption of fundamental randomness at the core of quantum physics must be challenged.

More generally, it might be speculated that these data imply support for the perennially popular idea that thoughts have effects in the world. It may be so, but it is far too early to know if this hypothesis will eventually be supported by strong confirming evidence and well-tested physical theory.

Conclusions

1. A one-second anomaly occurred during the terrorist attacks of September 11, but it is no more unusual than similar events on other occasional days in the database, and should not be considered significantly extra-chance. We agree generally with May and Spottiswoode on this point. In any case, the generators are typically only synchronized to within a few seconds of each other.

[7] See papers at www.boundaryinstitute.org/theoretical.htm for discussion of this theory and related work.

2. A significant increase in variance of more than 1/2 hour duration occurred around 9:30 UTC (5:30am EDT) on the morning of September 11. This anomaly is significant with odds against chance of thousands to one across a wide range of low-pass filters. No similar deviations were seen in four surrounding months of data. We have no immediate explanation for the provocative fact that this anomaly *preceded* the primary events of September 11 by over 3 hours.

3. A significant correlation among the EGGs and a dramatic increase in variance occurred beginning early in the morning on September 11 and continued throughout the day. Examination of several other days reveals no similar effects. This is perhaps the most interesting of the anomalies, since these random number generators are believed to be in principle independent.

In summary, something worthy of study occurred across the GCP's network of random number generators on September 11, 2001. Data from these RNGs were far more unusual and far more correlated than would be expected by chance alone. This single day can be uniquely and readily distinguished by statistical variance and correlation of the RNGs from any other day in the four-month period examined. The techniques used were simple, standard, and not specific to this data.

Of course, it should be emphasized that it is still possible that some simple or complex prosaic explanation can account for the behavior of the EGGs as seen here. None has been found thus far, despite significant thought and effort in this direction. Further investigation of these effects is strongly indicated, and potentially important to the point of urgency. In addition to further analysis of GCP EGG data, we also recommend small-scale laboratory and other experiments with RNGs to further explore these phenomena.