Mind Matter and Machines
Tools for Anomalies Research

PEAR Laboratory, Princeton University

Invited Presentation for the Internationaal Jubileumcongres
75 Jaar Wetenschappelijke Parapsychologie, Utrecht, 3 mei 2003

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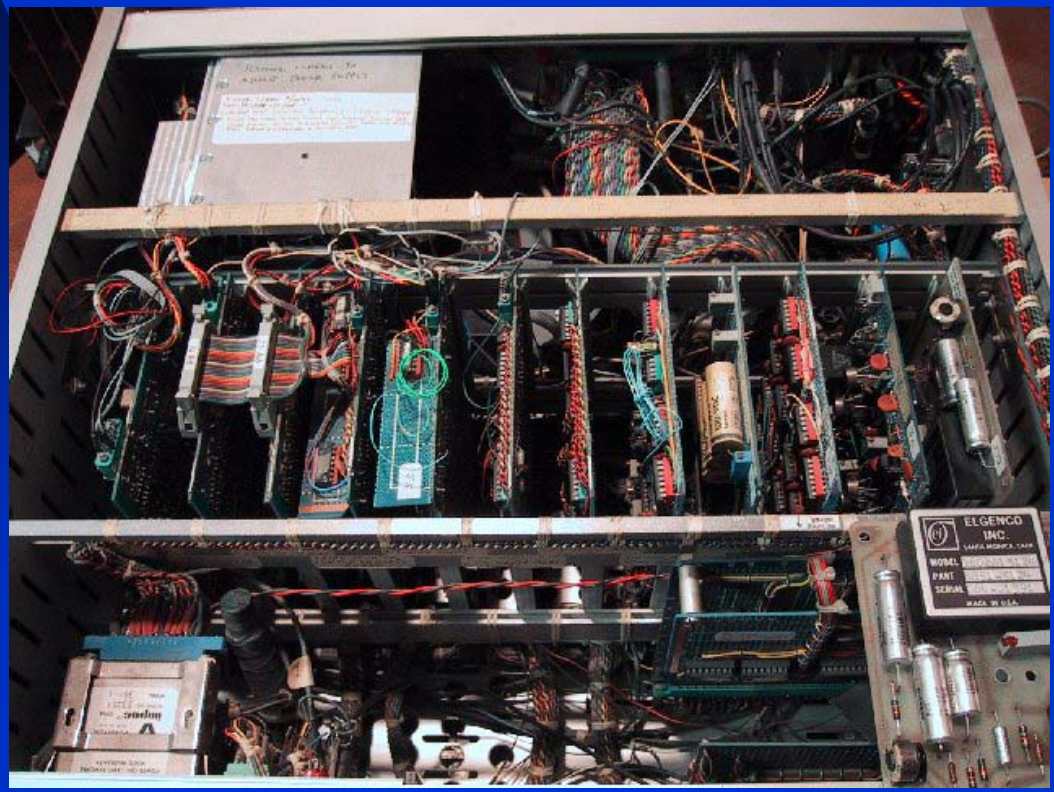
Designing a flawless experiment is extremely difficult, and carrying one out is probably impossible.

- - Jessica Utts, *Seeing Through Statistics*

The beginning of a viable Experiment is good design And careful implementation

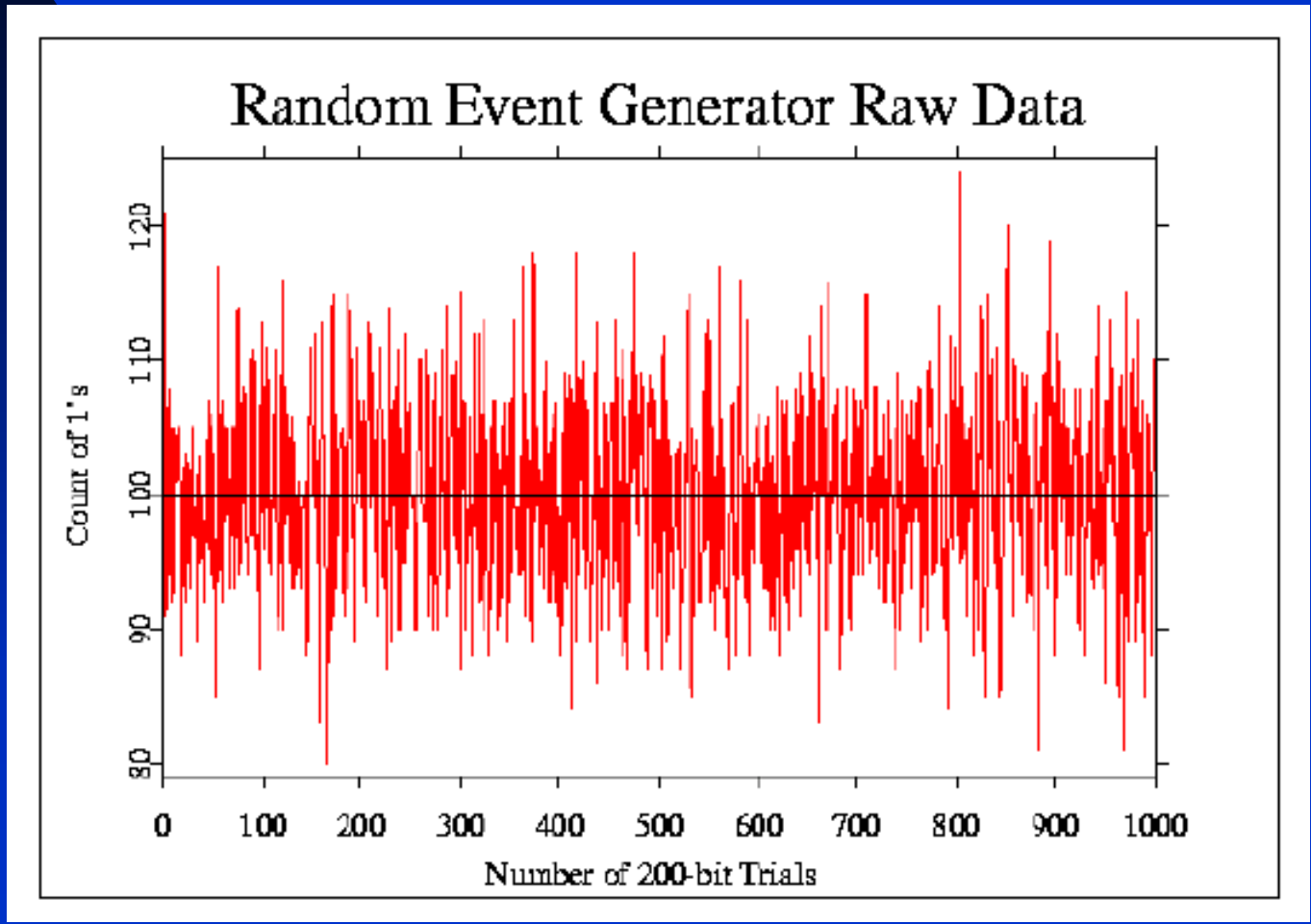
This is the beautiful and robust wiring inside the Benchmark REG used for the First decade of PEAR Mind/Machine Interaction experiments



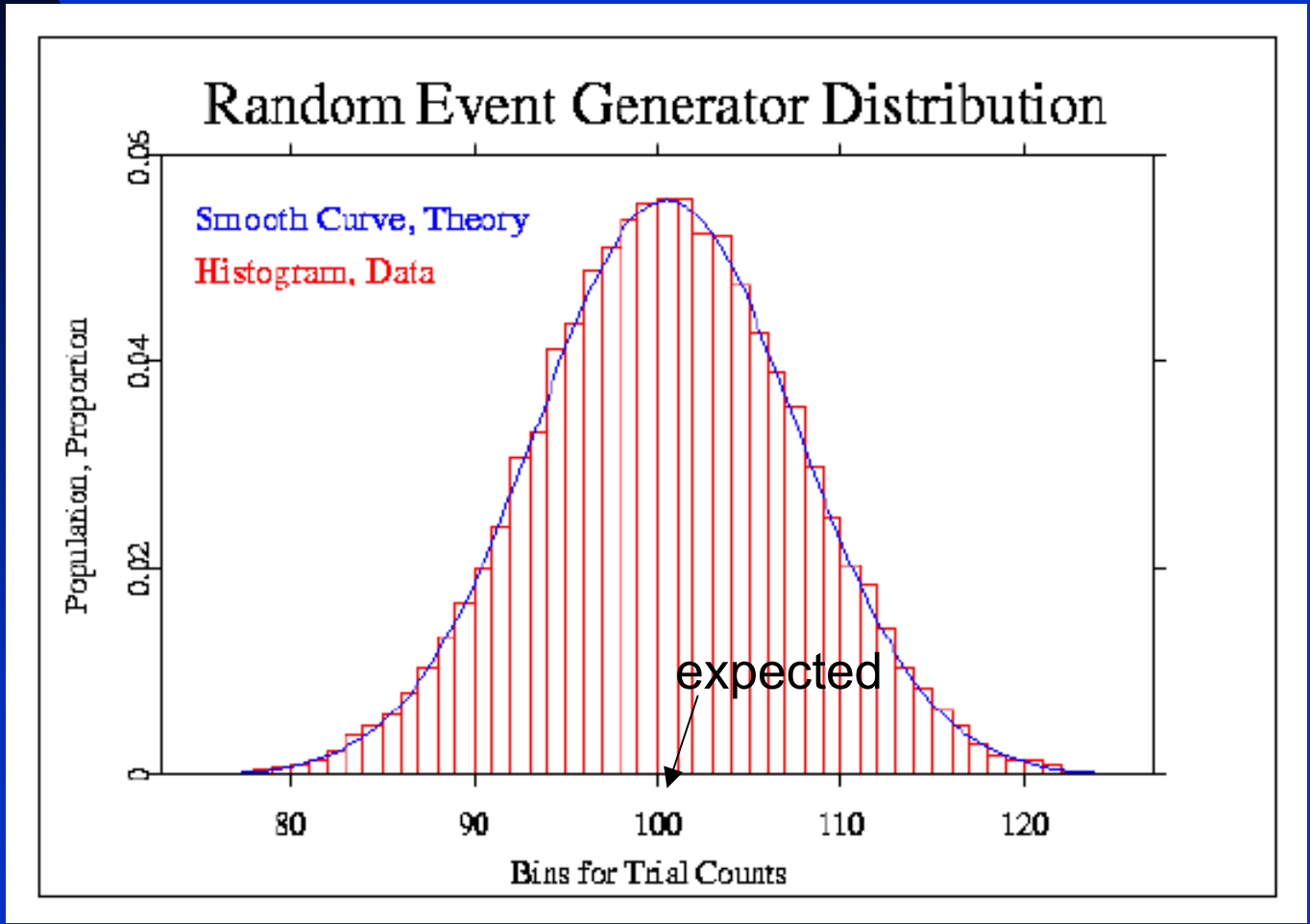
The technology has been developing Over the last four decades

- Reliable, calibrated REG/RNG devices
- Increasing sophistication of design
- Computer recording and analysis
- Controlled explorations
- Theoretical questions
- Robust analyses

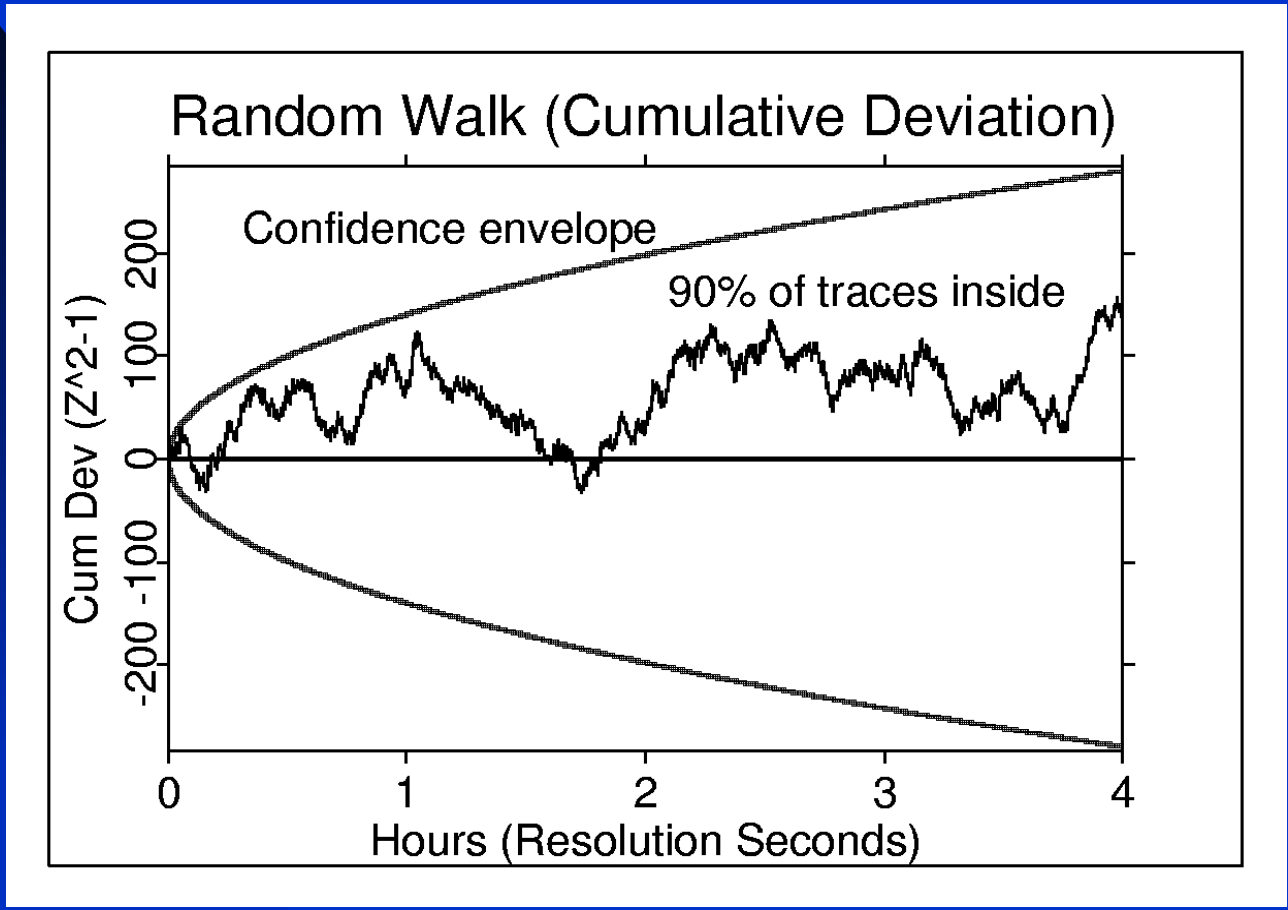
How it works: Here's 1000 Trials from A physical random source Each trial is the sum of 200 bits



The binomial distribution of 1000 200-bit trials, compared with Theoretical normal distribution

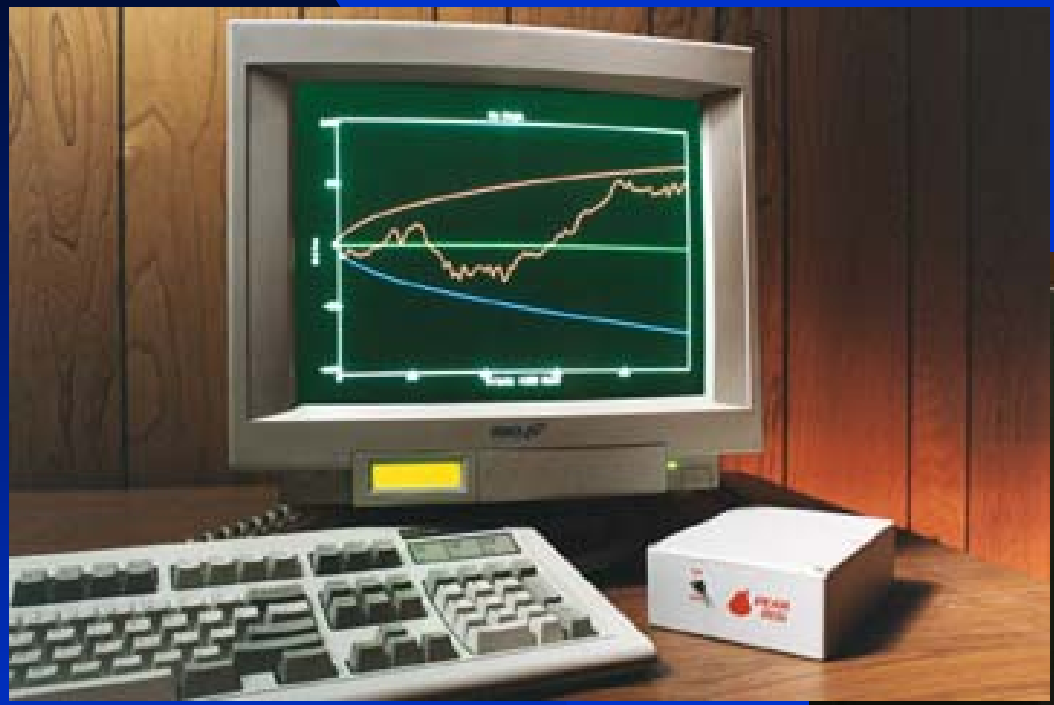


What happens to the data over time?
Plot cumulative deviation from expectation

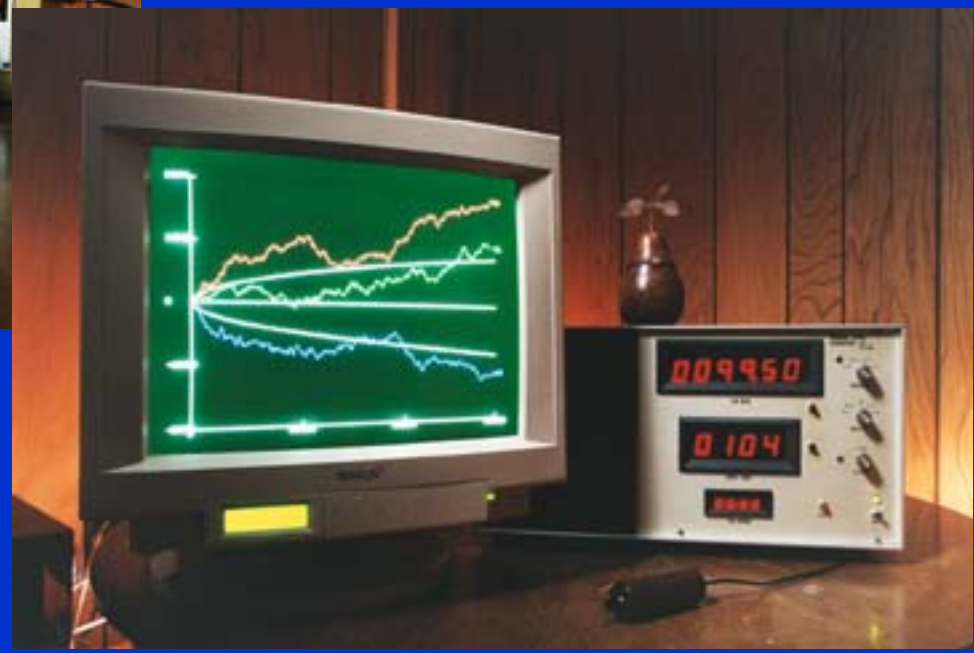


Should be a Random Walk (a "Drunkard's Walk")

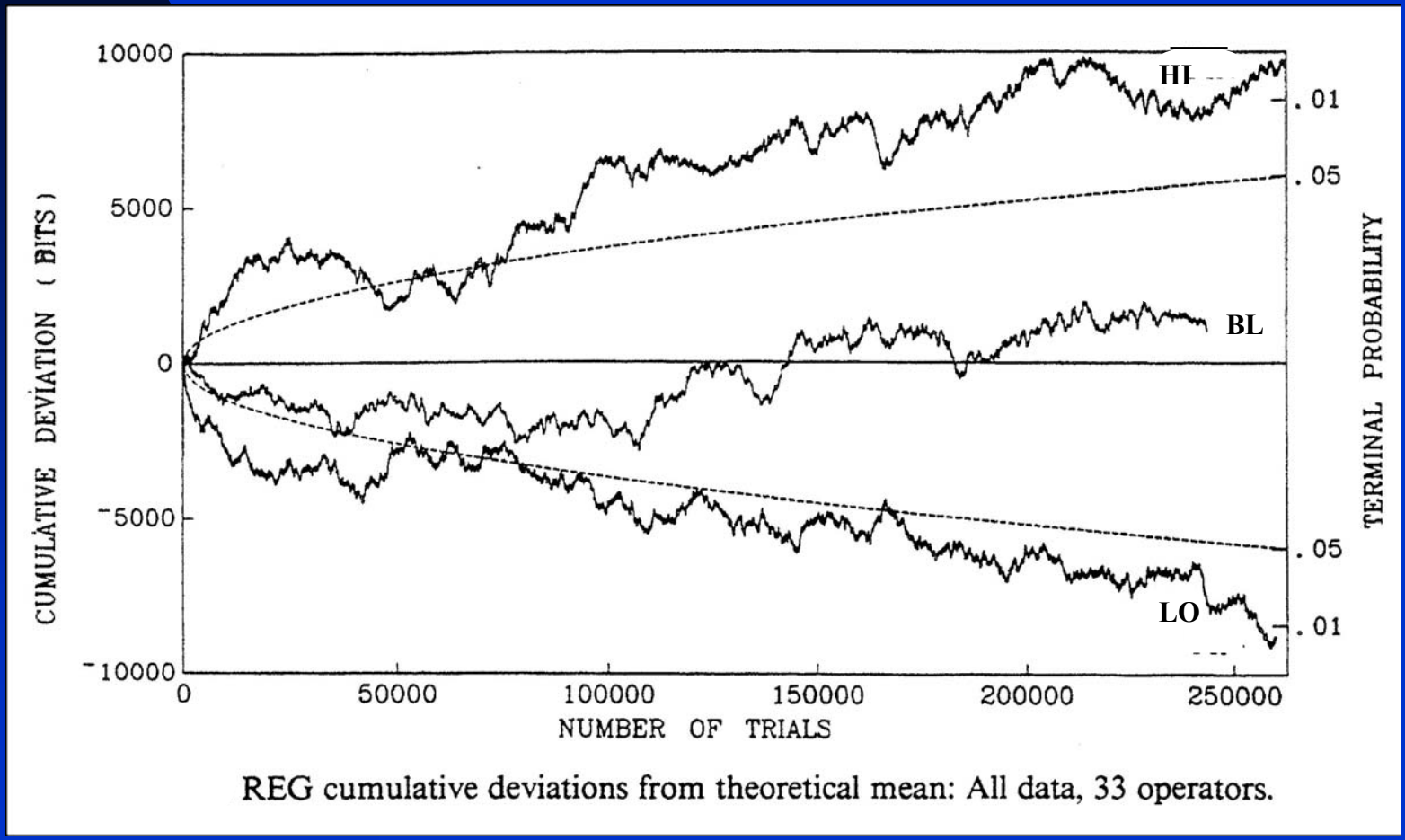
The REG technology is basic
Experimental questions can vary
Feedback and perspective change outcome



Feedback mode can be simple numbers, a racetrack, or plots of cumulative deviations Is one of these better?

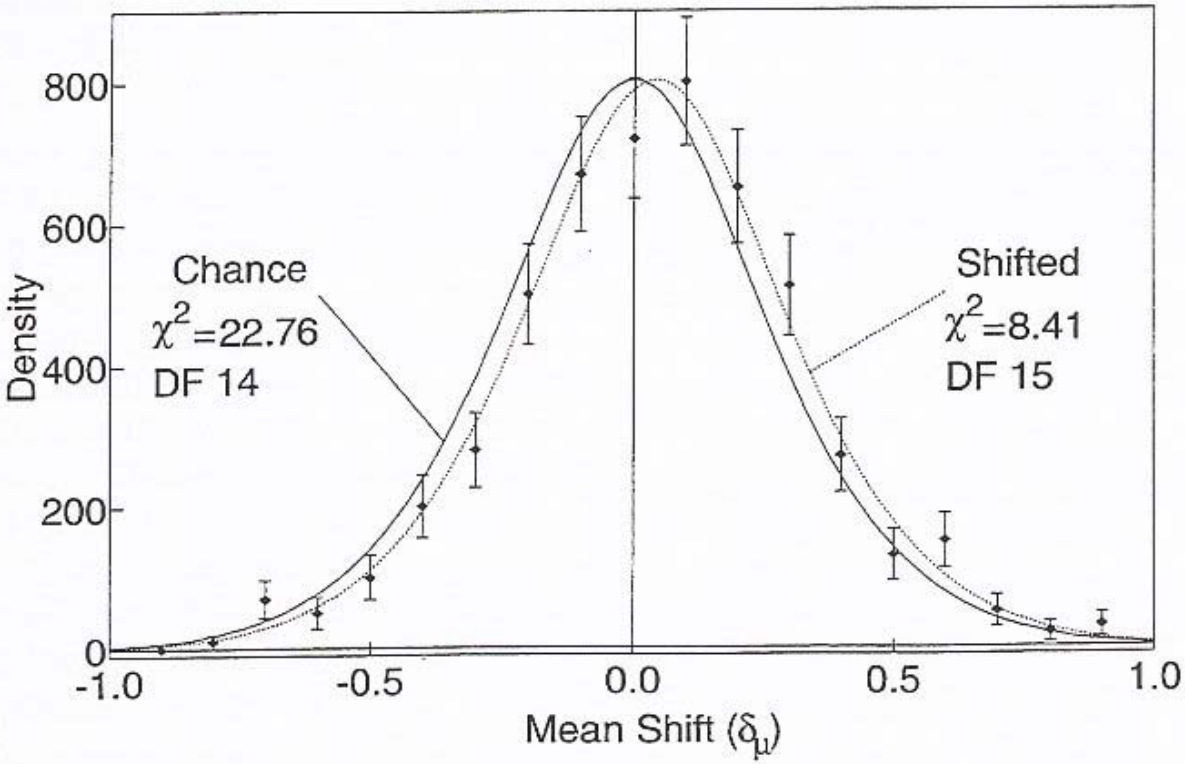


PEAR's Long-Running REG Experiment: Intention to change the REG behavior High and Low both depart from expectation



REG cumulative deviations from theoretical mean: All data, 33 operators.

12 Years, 522 REG Experiments: The Difference Between High and Low Intention is Small, but is a Significant Shift

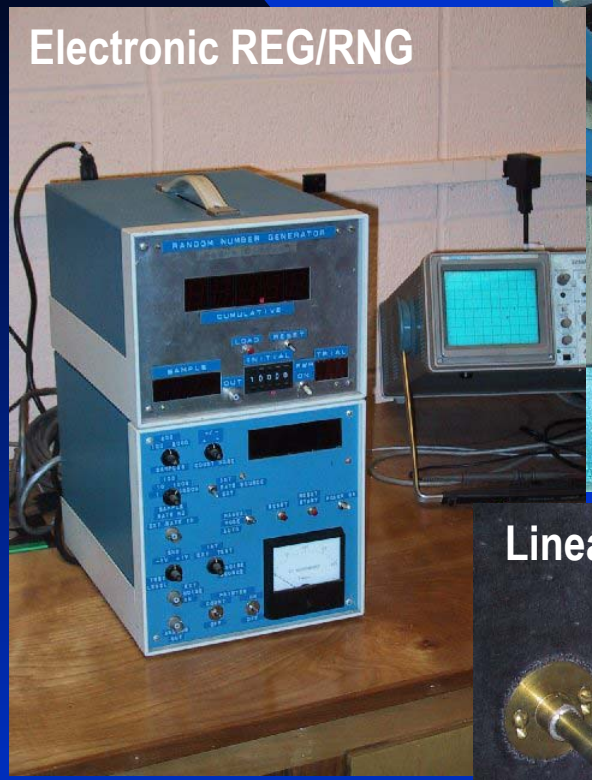


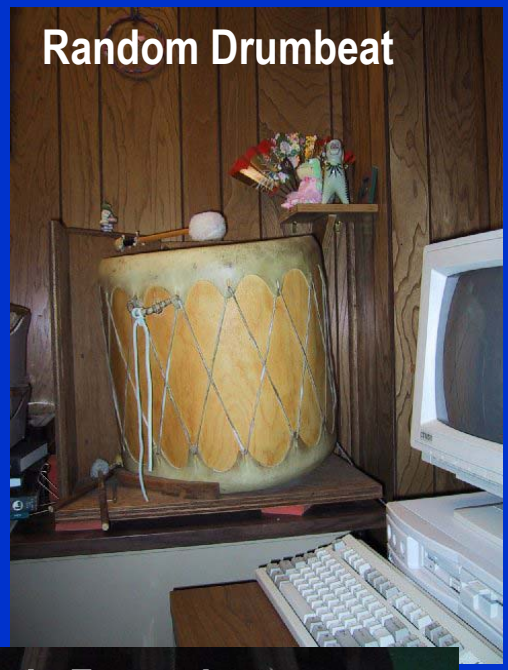
Density plot of 522 series HI-LO mean shifts achieved on benchmark experiments, superimposed on theoretical distributions centered on the chance and empirical mean-shift values (constructed as in Fig. 5).

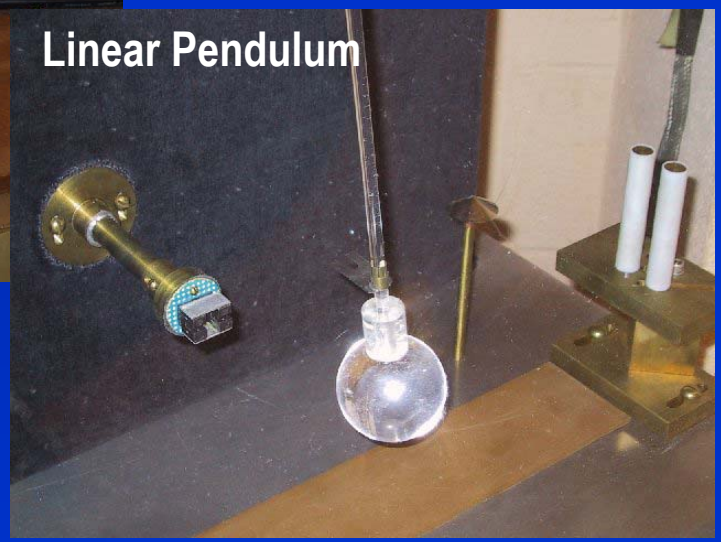
Other Experiments with Random Physical Systems

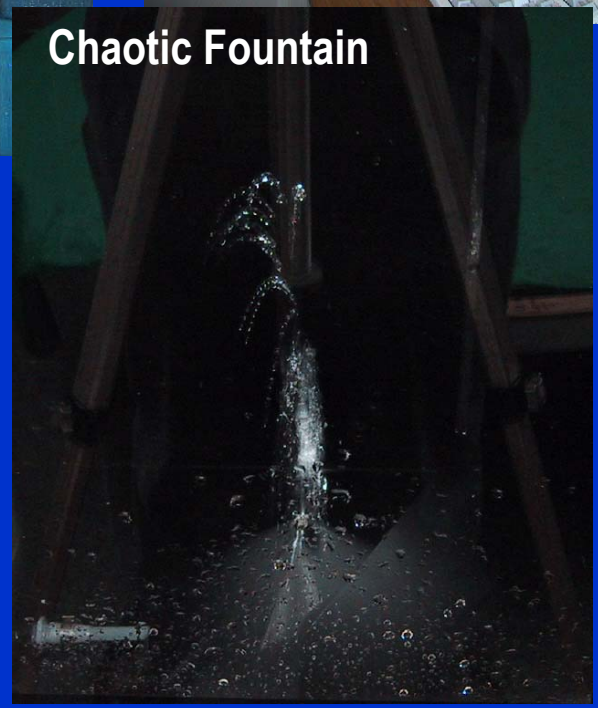
- Fabry-Perot Interferometer
- Crookes Tube
- Dual Thermistor
- Degraded Shift Register (Chip)
- Random Mechanical Cascade
- Linear Pendulum
- Linear to Turbulent Flow (Fountain)
- …

We have used many machines
All based on Random Sources









An Onboard REG controls the path of a Robot (with a Frog passenger) Poisson distributed rotation and distance

Random Mechanical Cascade (RMC)

The Pinball Machine

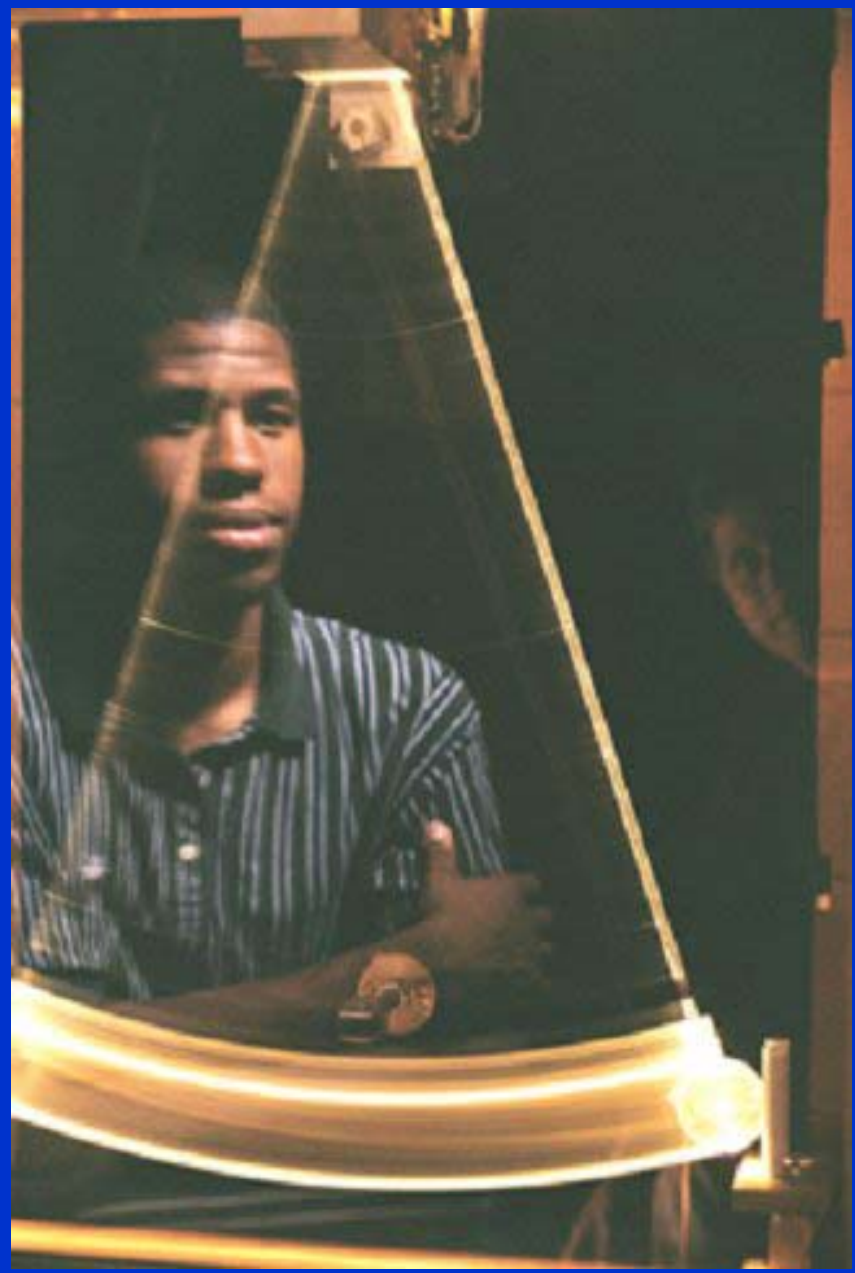
“Murphy”

10’ high 6’ wide
9000 ¾ inch balls
330 ¾ inch pins
19 collecting bins

A Linear Pendulum
Swinging in Air

Increase or
Decrease Damping

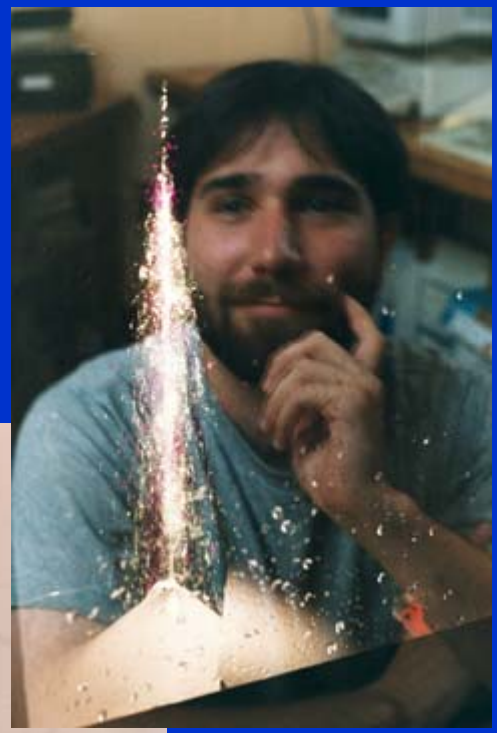
Knife edge breaks
An LED beam
Timing by a 50
Nanosecond clock



A Constant Pressure Fountain

Attempt to make it more Chaotic or more Linear

Photomultipliers detect changes in frequencies



New generations of Random Sources

PEAR B-Box: Thermal Johnson Noise

Mindsong: Field Effect Transistor

Replications and Extensions

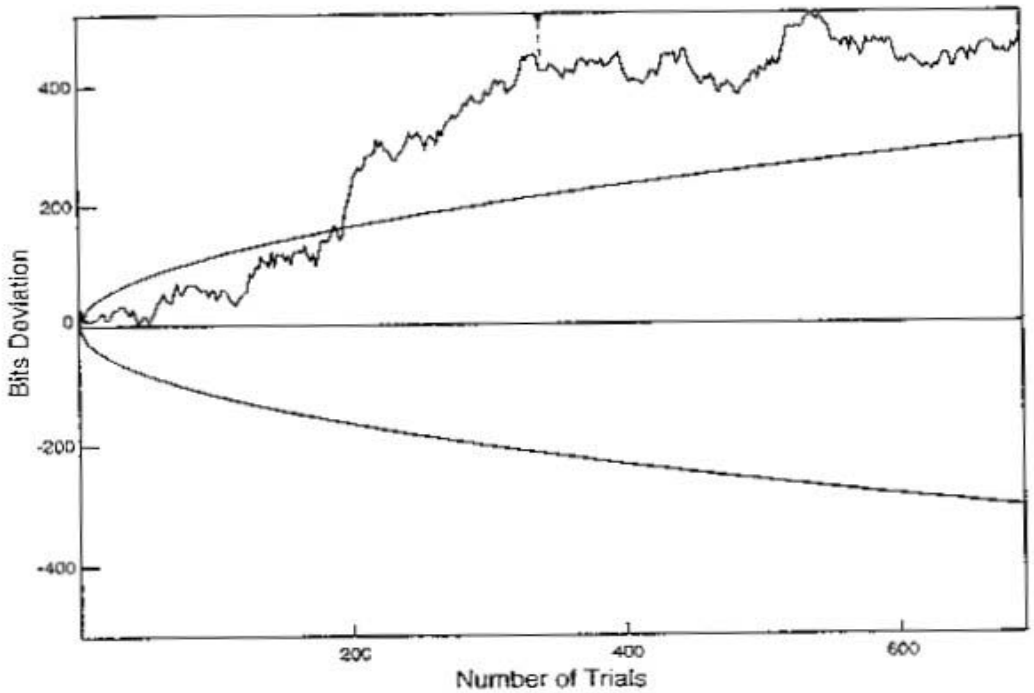
Palmtop Portability

An REG randomizes the beats of a drum
We have primitive motivations
To create rhythmic patterns
Does the REG output change?

ArtREG: Two pictures each get half the Pixels, then an REG outcome shifts some. Try to get one picture to take all the pixels.

PEAR 200: Two “cars” on a racetrack. REG outcomes determine the speed. A PK experiment with competition.

Broader Applications: A continuous running REG in the lab, with software to mark events. In November, 1995, Rabin was Assassinated



Cumulative deviation of ContREG data recorded in Princeton at the time of the assassination of Prime Minister Rabin. The graph shows a ten-minute period of time exactly centered on the time of the shooting. The horizontal line shows the expectation, and the parabolic envelope shows the locus of the 0.05 probability for so large a deviation as the database increases.

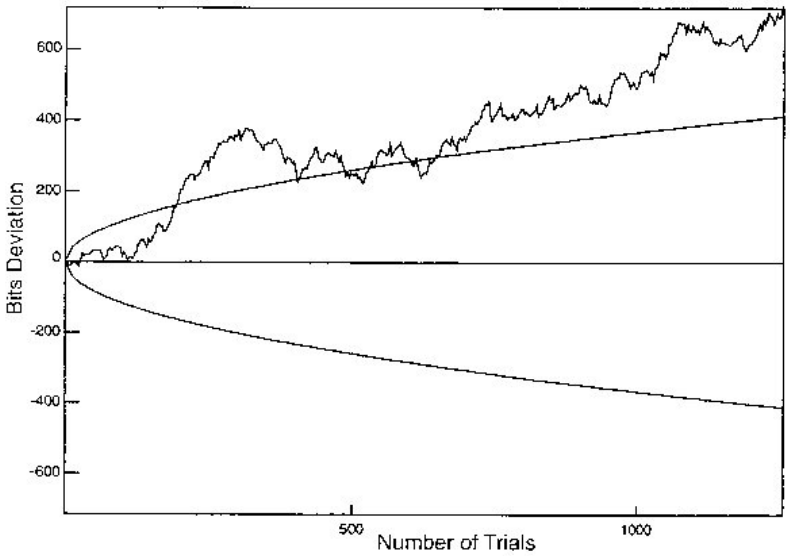
Micro Random Event Generators (REG or RNG)

Mindsong REG

Orion RNG

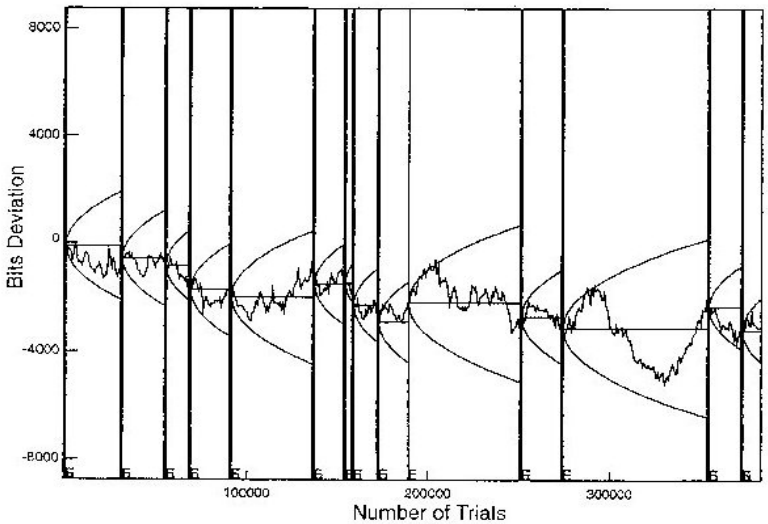
Field REG Experiments: Take portable REG With Palmtop Computer into the Field Resonant vs Mundane Situations

A Shaman in a Healing Ceremony



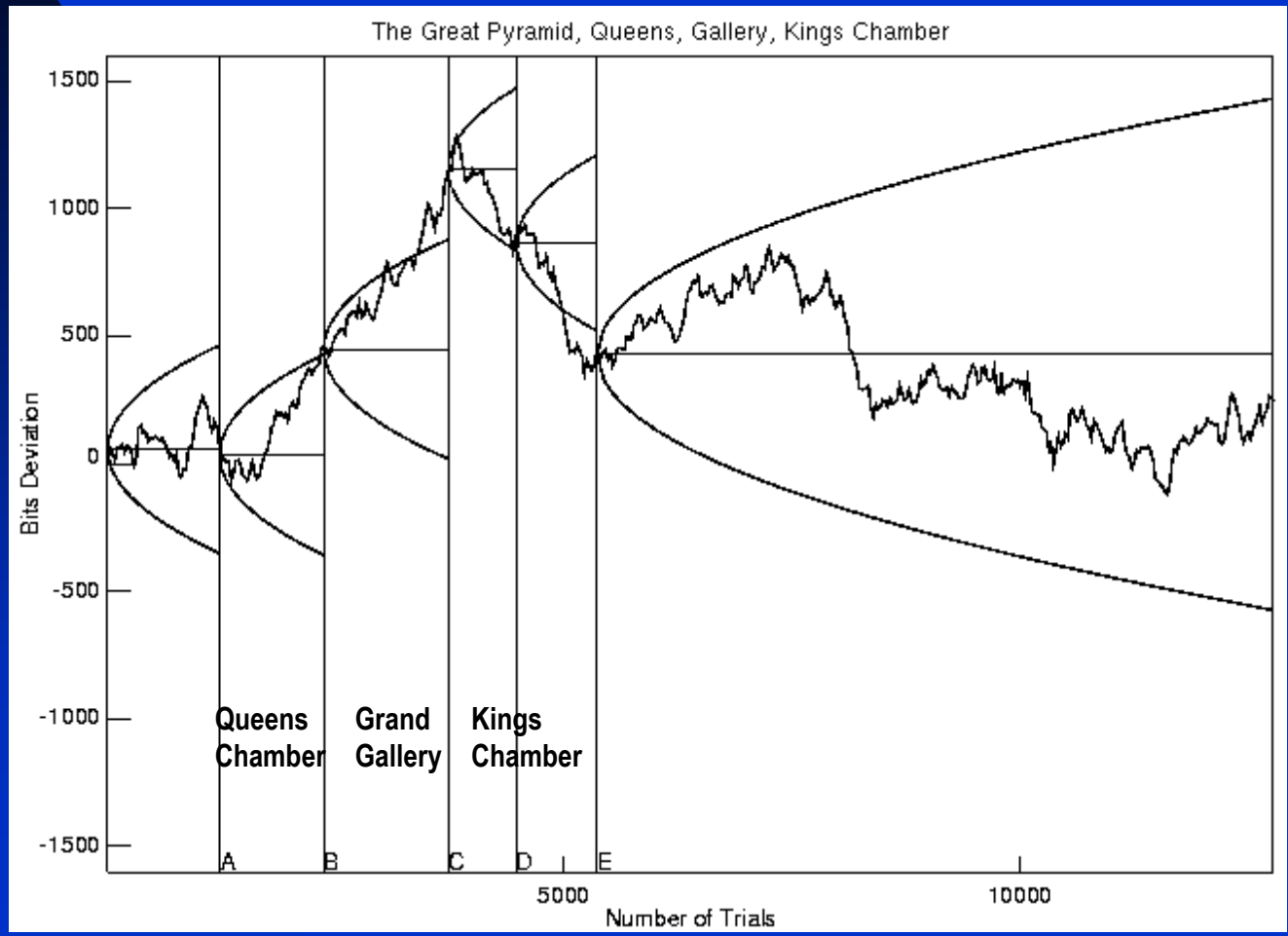
Cumulative deviation of FieldREG trace during a 20-minute healing ceremony performed by a Shoshone shaman at Devils Tower. The horizontal line shows the expectation for the random walk described by the accumulating deviations, and the parabolic envelope shows the locus of the 0.05 probability for so large a deviation as the database increases.

Scientific talks at a Conference

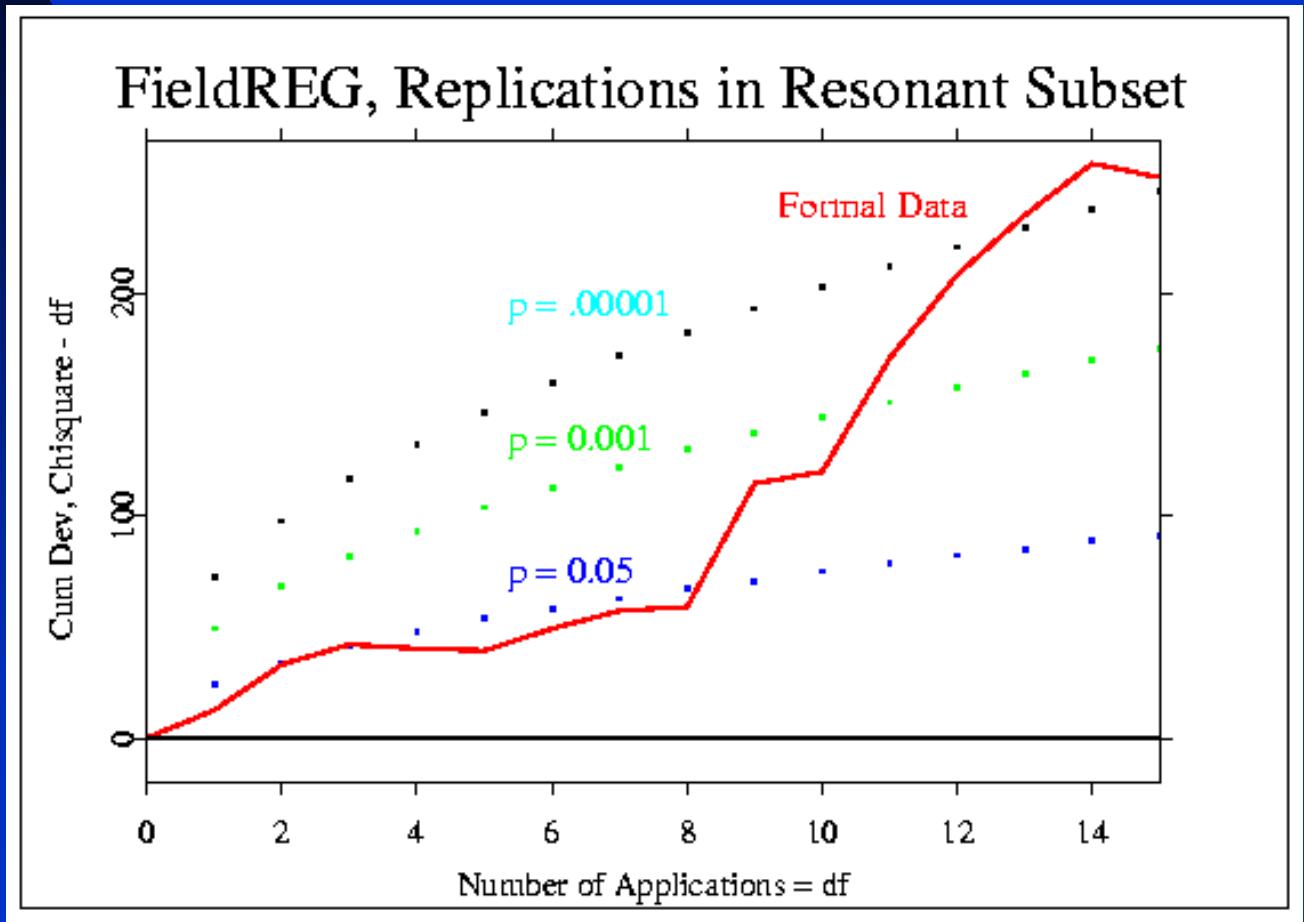


Cumulative deviation of FieldREG trace during the Annual Convention of the Parapsychological Association, 1995. Vertical lines indicate the beginnings and ends of sessions, each of which contained several presentations of 15 minutes duration or more. The horizontal lines in each segment show the expectation, and the parabolic envelopes show the locus of the 0.05 probability for so large a deviation as the database increases within that segment.

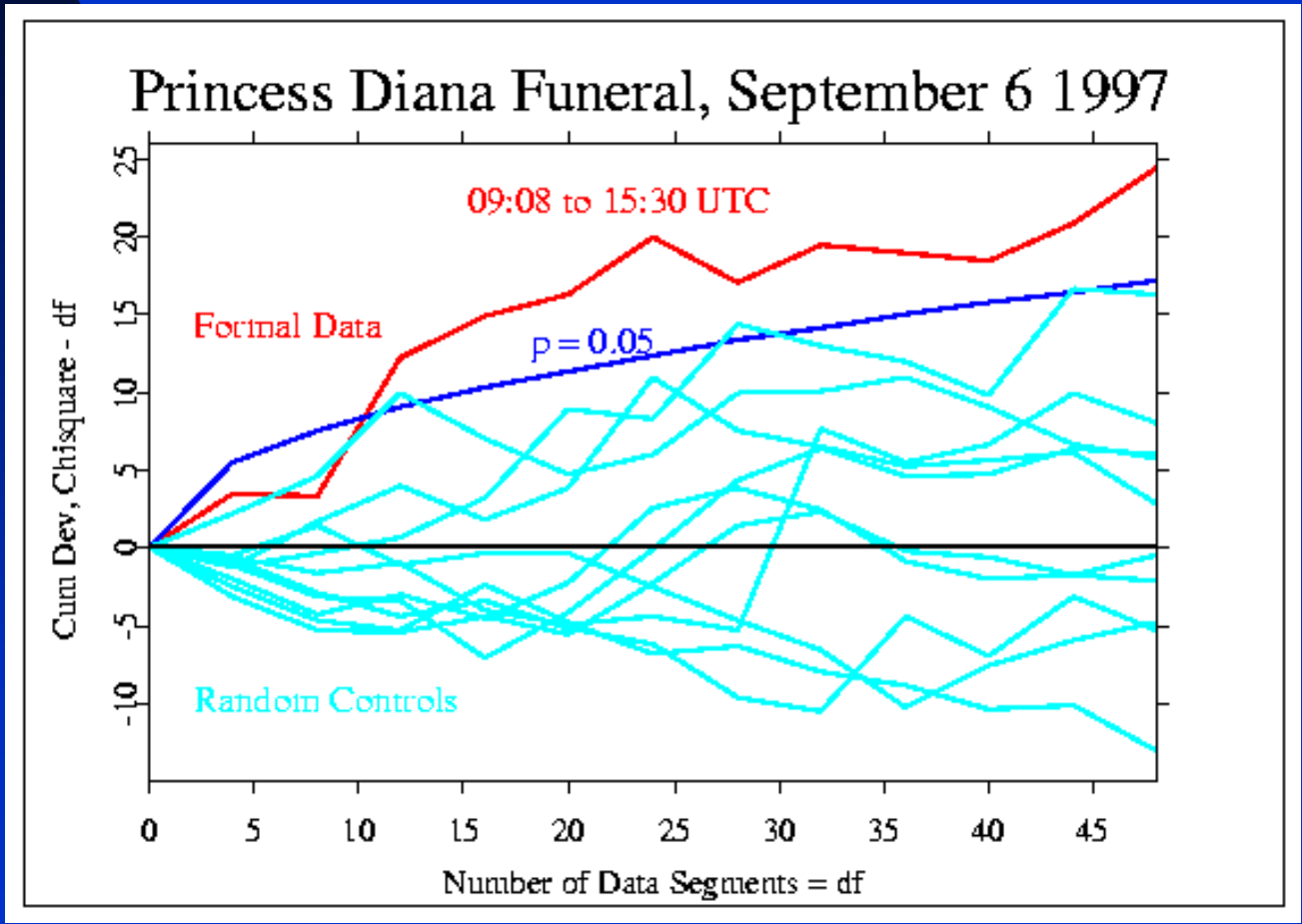
In FieldREG there are no assigned Intentions
We simply collect data in the situation
We find departures from expectation



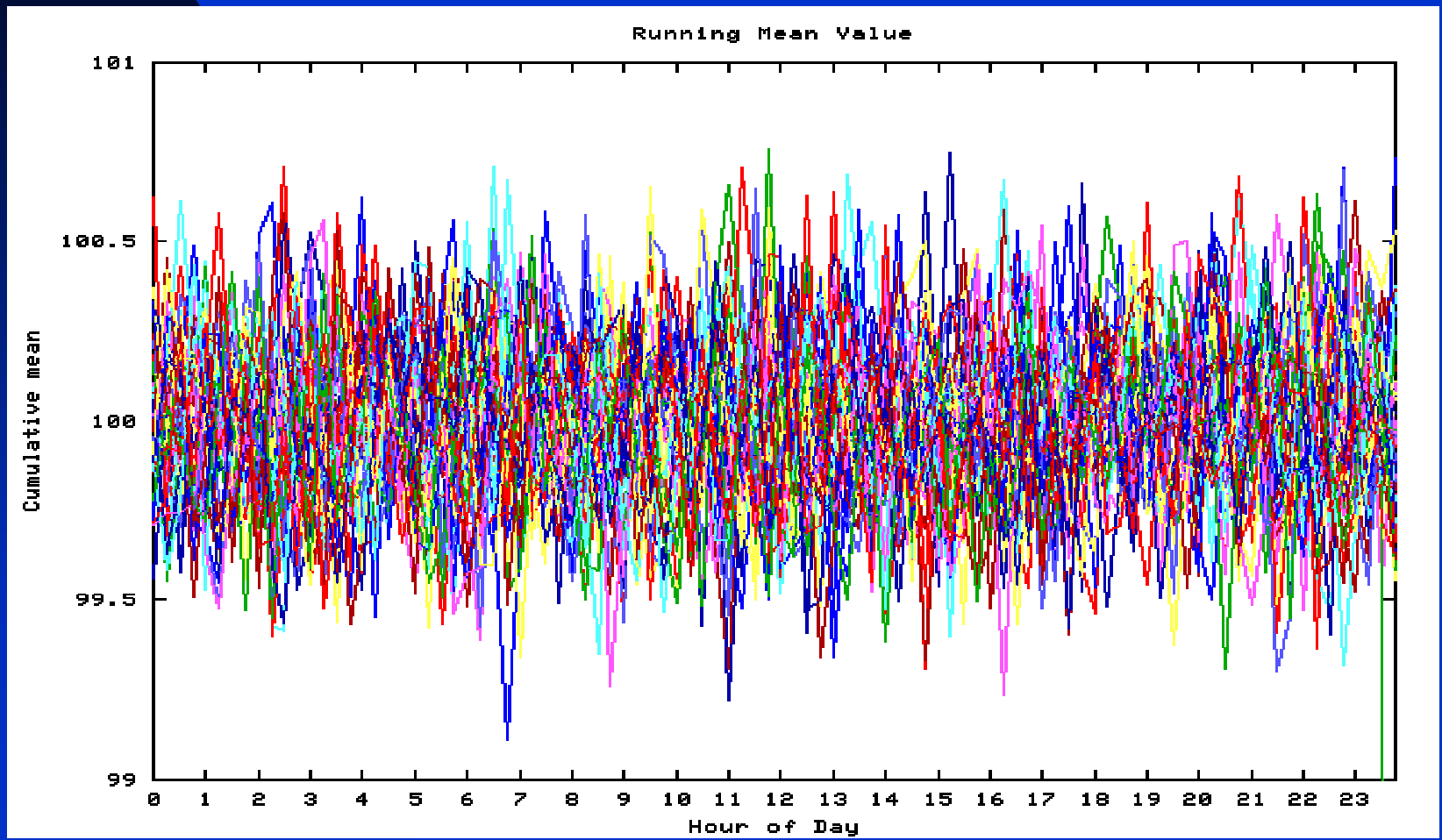
Departures from expectation correlate with Coherent or Resonant group consciousness Deeply engaging ideas and emotions



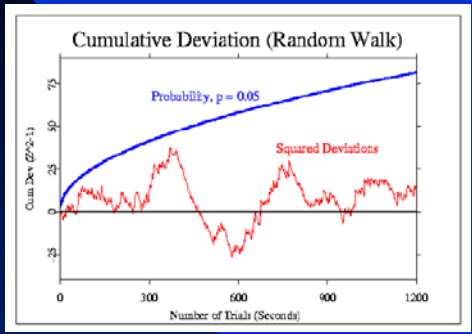
Going Global: A prototype collaboration
Colleagues in Europe and the US
Collected 12 independent data streams

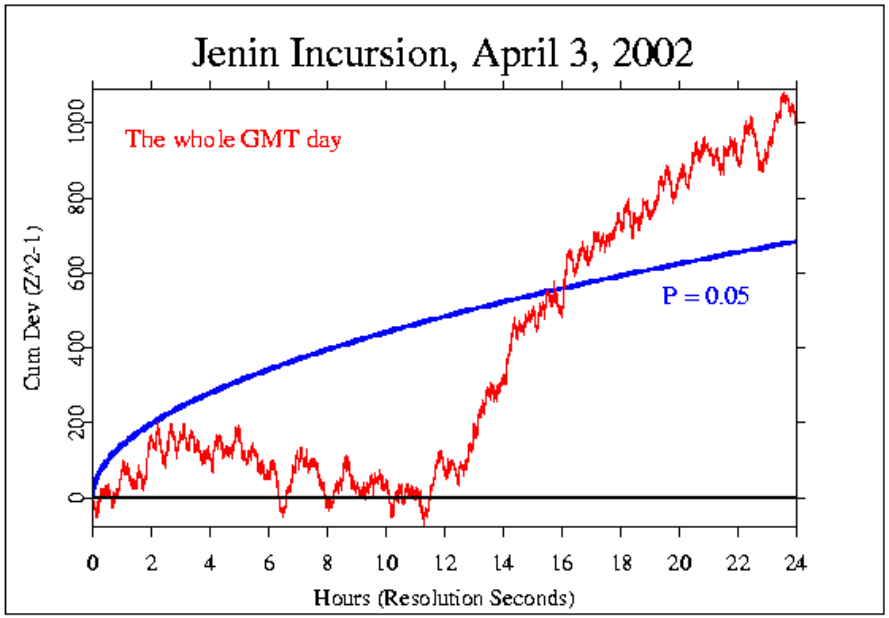


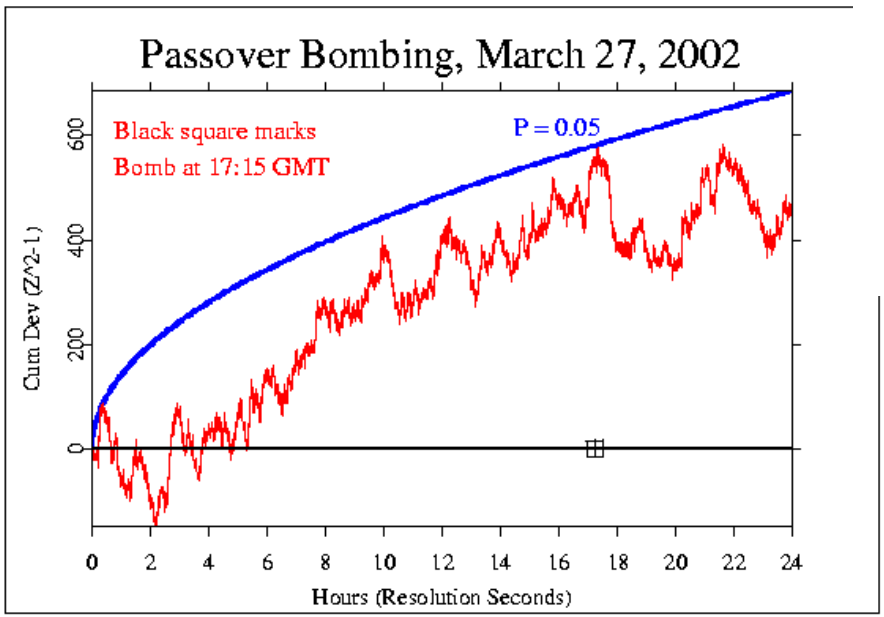
Global Consciousness Project: Raw data for a whole day, from 48 eggs. We look at means during special periods



If Trends of the Mean are Correlated with Major Events in the World, it Suggests that The Deviation is Meaningful





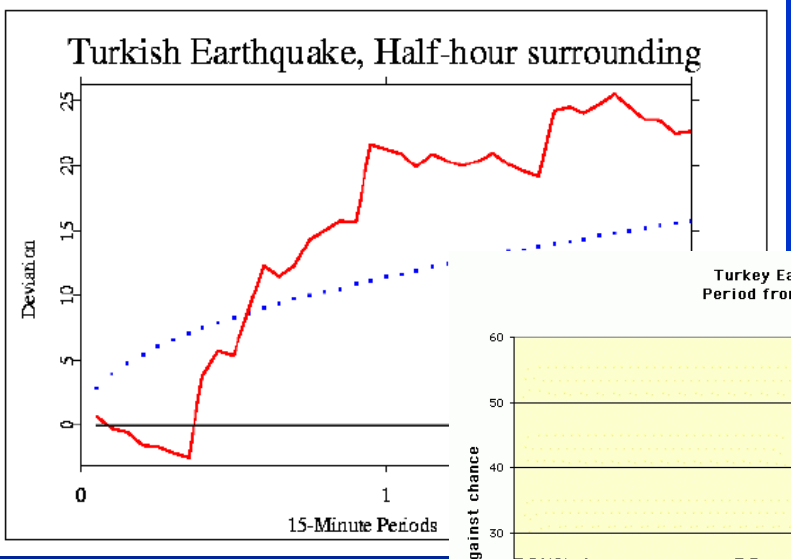


Examples of the Range of Potential Global Events:

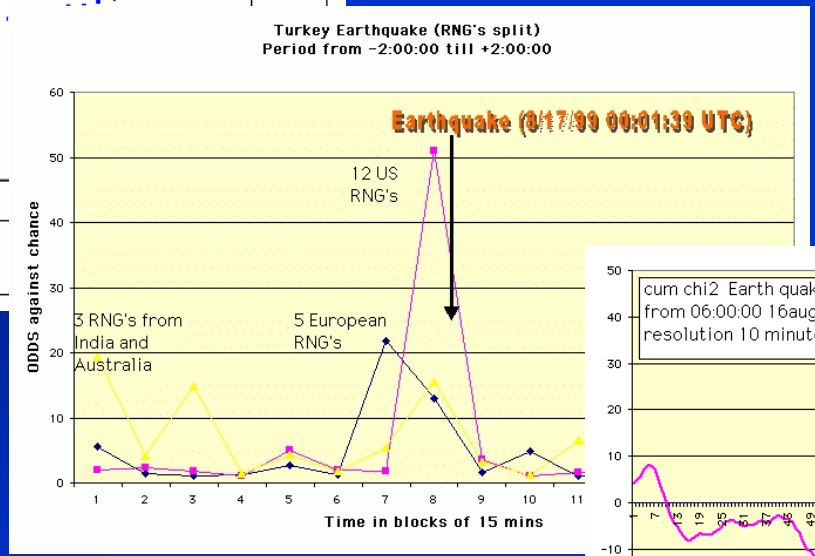
Natural disasters
Terrible accidents
The beginning of war
The Pope's pilgrimage
Grand celebrations
Political excitement
Astrological hot spots
World-wide meditations

The Great Earthquake in Turkey August 17 1999

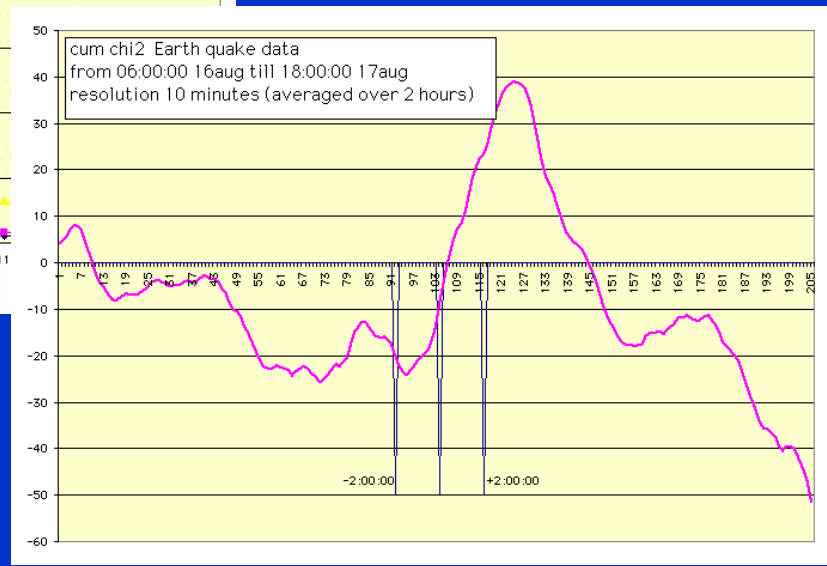
Standard Analysis



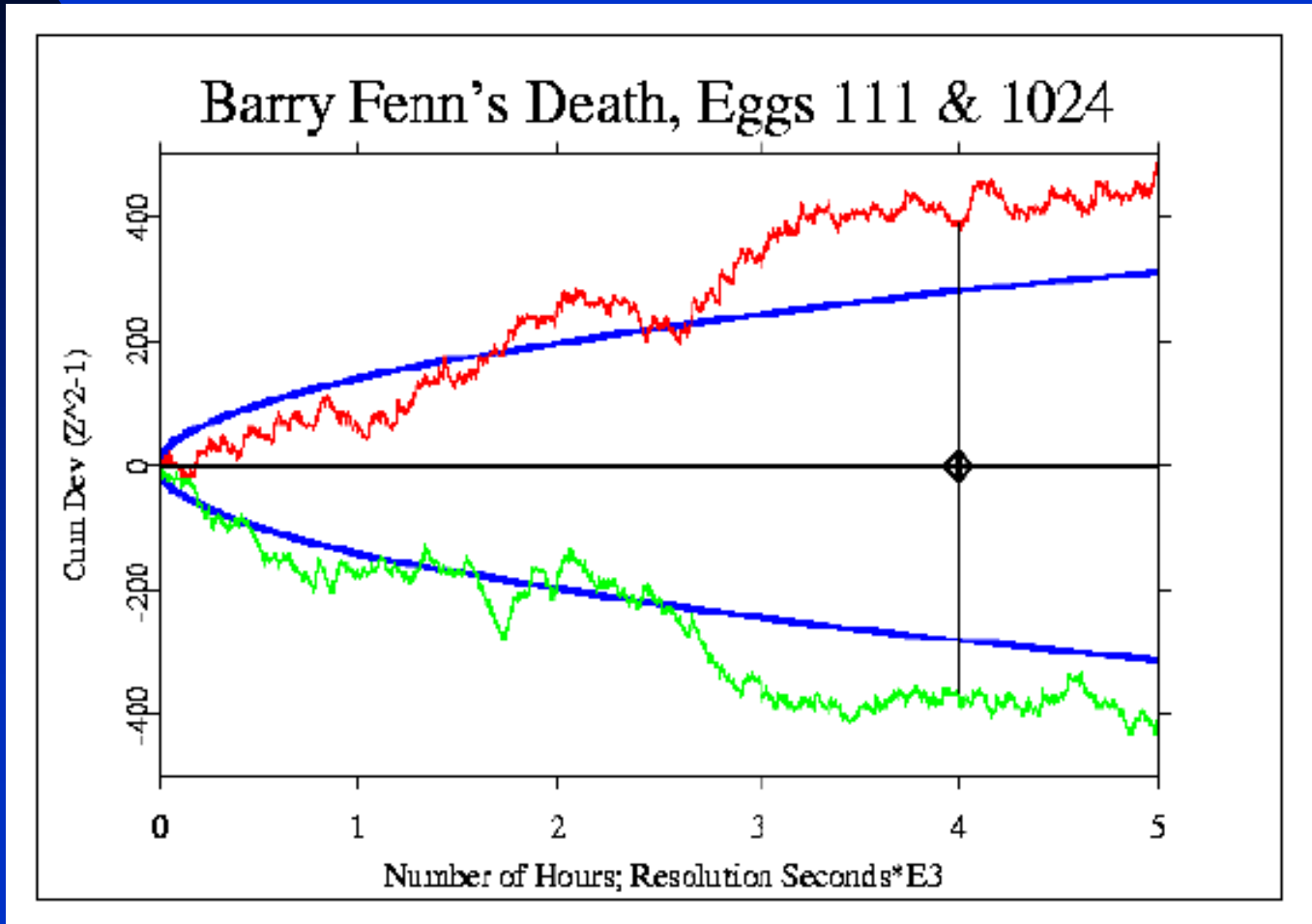
US vs Europe, Bierman



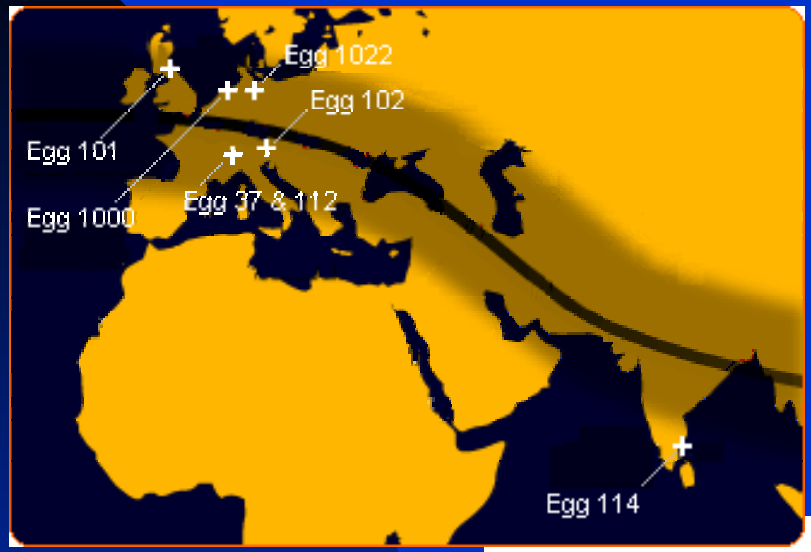
Variance Analysis, Bierman



Symmetry in the data, maybe even meaning: Barry's egg and that of his friend, Sze Tan



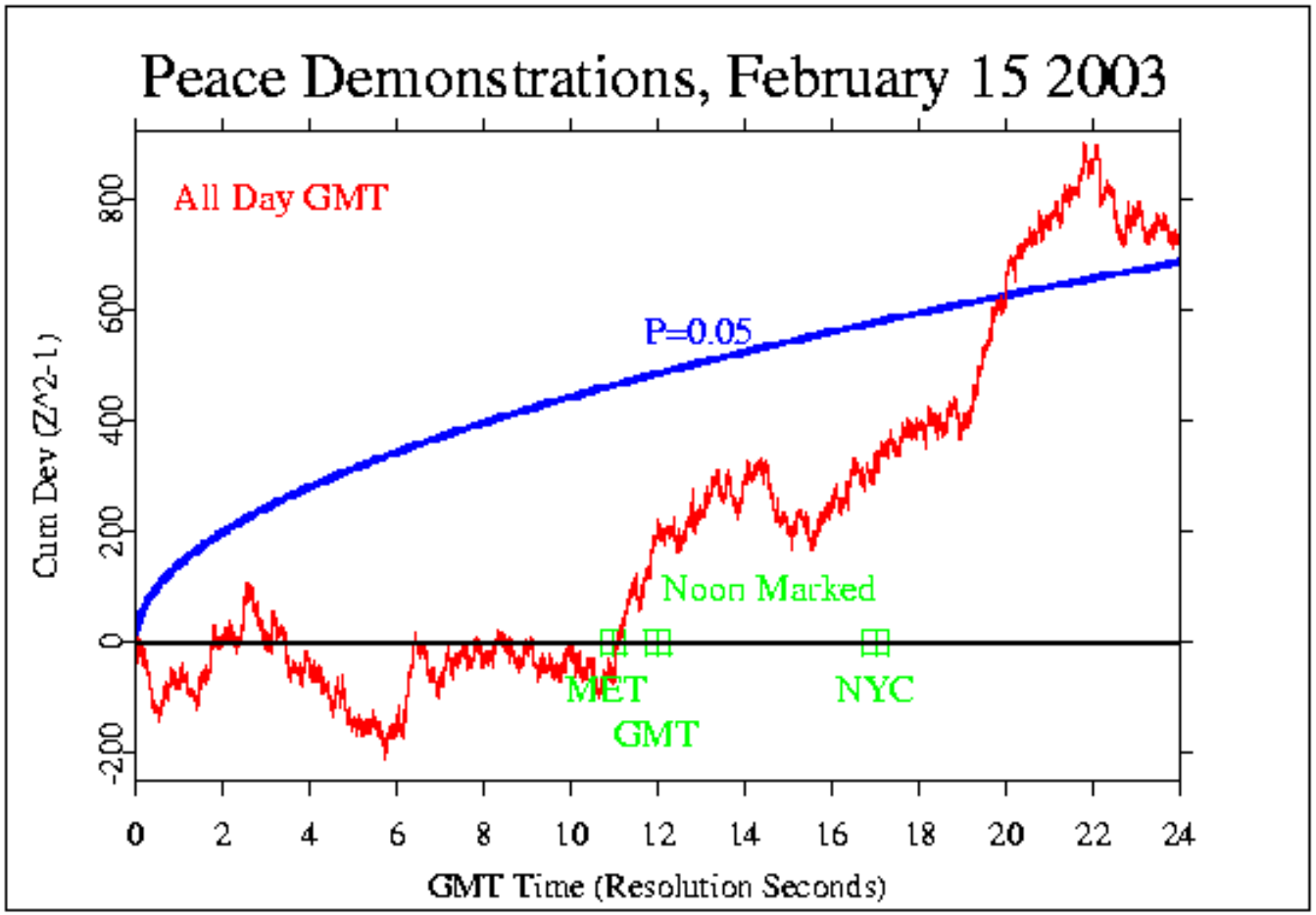
A total solar eclipse was of Special interest to people in the path



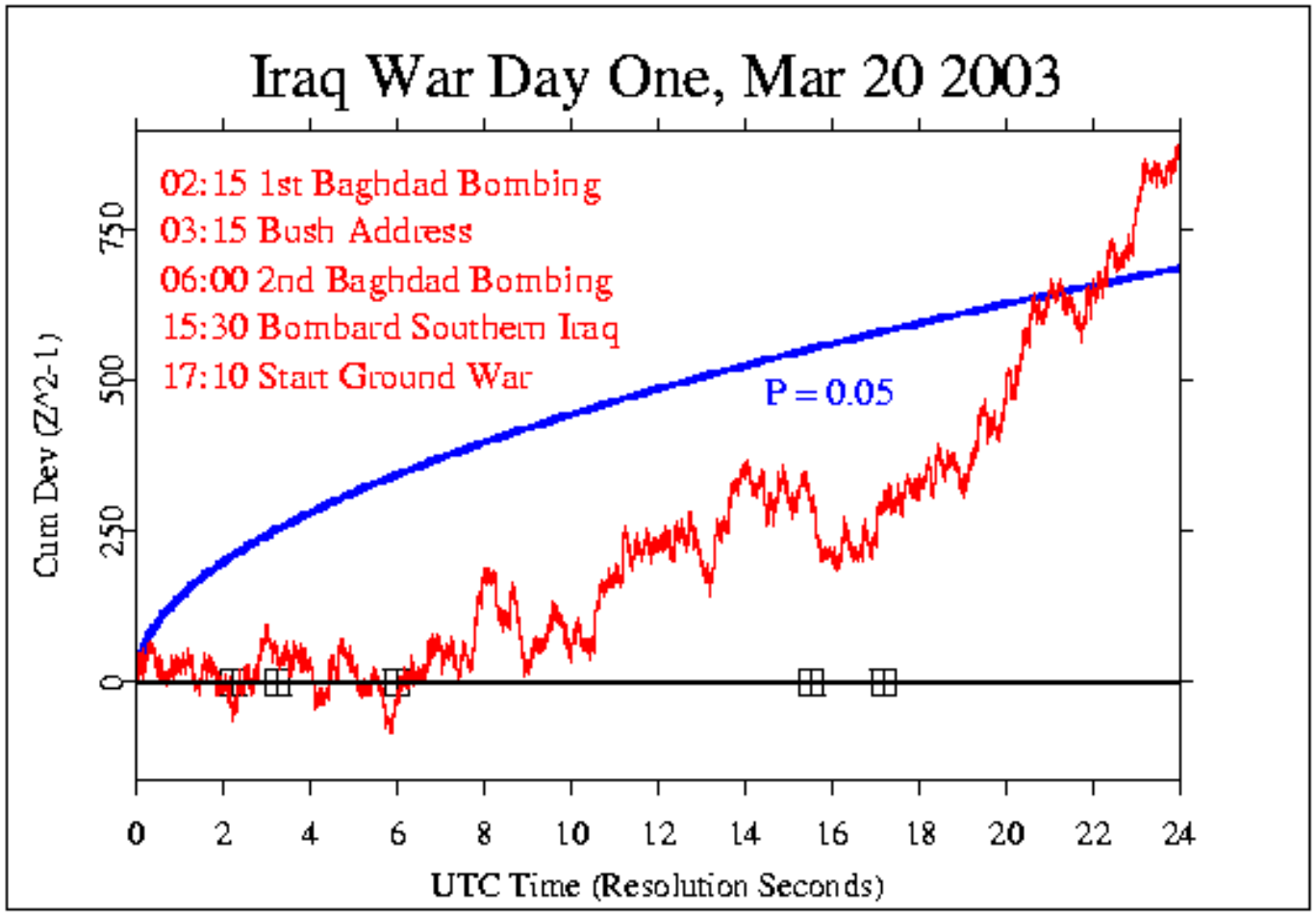
Analysis: George deBeaumont

			peak			period		
id	location		df	chi-sqr	p	df	chi-sqr	p
101	Edinburgh, Scotland	data	5042	5231.3	0.0308	9481	9687.3	0.0678
		control	5042	5023.5	0.5706	9481	9494.7	0.4585
1000	Amsterdam, Netherlands	data	4712	4812.2	0.1511	9421	9549.6	0.1743
		control	4712	4755.0	0.3269	9421	9372.6	0.6362
37	Neuchatel, Switzerland	data	4982	4930.0	0.6970	9961	9957.4	0.5083
		control	4982	4936.6	0.6735	9961	9960.2	0.5004
112	Neuchatel, Switzerland	data	4982	5082.8	0.1563	9961	10041.0	0.2843
		control	4982	4905.6	0.7772	9961	9898.0	0.6710
1022	Braunschweig, Germany	data	4742	4912.2	0.0415	9481	9588.8	0.2163
		control	4742	4529.2	0.9865	9481	9437.3	0.6229
102	Wien, Austria	data	4952	5170.1	0.0151	9901	10136.0	0.0483
		control	4952	5048.2	0.1667	9901	9987.2	0.2691
114	Madras, India	data	2372	2521.1	0.0166	4741	4843.5	0.1464
		control	2372	2379.9	0.4506	4741	4849.3	0.1334
		data	31784	32659.7	0.0003	62947	63803.6	0.0081
		control	31784	31578.0	0.7928	62947	62999.3	0.4407

Voices For Peace -- World-Wide Conscience -- Global Consciousness



And Yet -- A Preemptive Attack
The March to War is No Random Walk

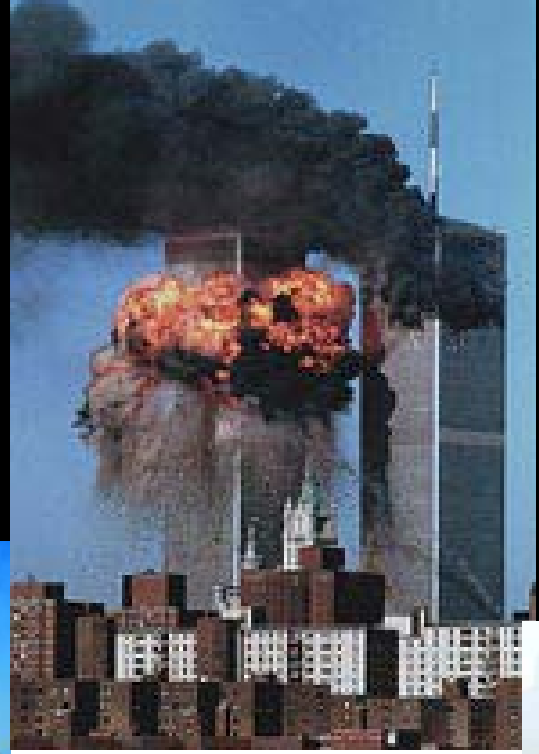


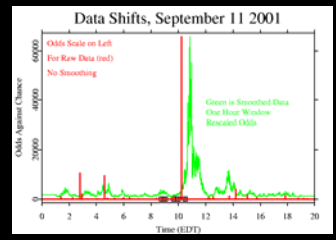
Global Emotion: Transfixed by Tragedy

On September 11 2001, early in the morning, a network of physical random event generators (called "eggs") took on a striking trend. By 8:45 the non-random behavior was unmistakable. It peaked at about 10:30 with odds against chance of a thousand to one. See the red trace below.

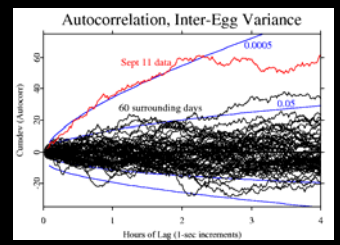
Other measures also deviated from expectation on that day, creating an unmistakable pattern where there should be none. The eggs became linked across distance and time in some subtle way that we do not yet know how to explain.

This is not a physical or electromagnetic effect. It's not due to extraordinary mobile phone use, or saturation TV.
It appears to be related to our profound engagement.





On 9/11 the data showed extraordinary moments



On 9/11 the data contained unique sequential structure

On 9/11 deviations began that persisted for 2 days

The jagged red line shows three days of a measure (squared cumulative deviation of variance) that represents the composite randomness of 37 eggs.

On September 11, the data show clear structure where there should be none.

5:00 am

8:45 am

10:30 am

Normal range of variation

9/10

9/11

9/12

More at http://noosphere.princeton.edu

Global Attention: Sharing New Year's Eve

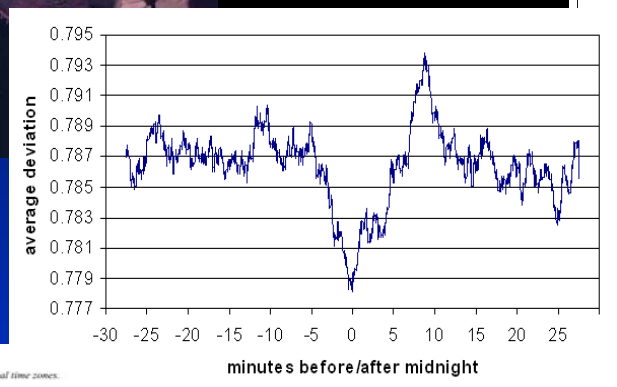
All over the world, people celebrate the change to a New Year. Since 1998, we have recorded data from a network of physical random event generators (called "eggs"). Here we look at what happens at midnight around the world.

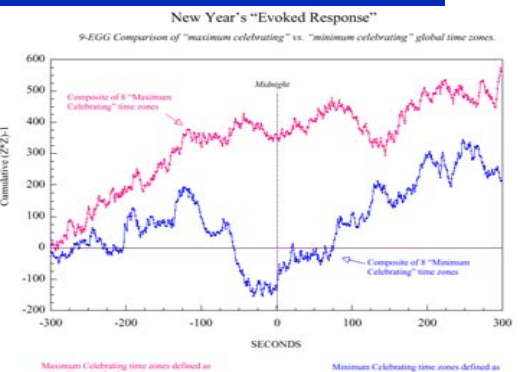
The scientific prediction is that there will be a pattern of increased correlation among the eggs. We test for trends away from the expected "random walk". We have learned to expect reductions in the variation across the eggs.

The figures on this page almost speak for themselves. They are pictures of our engagement with each other.

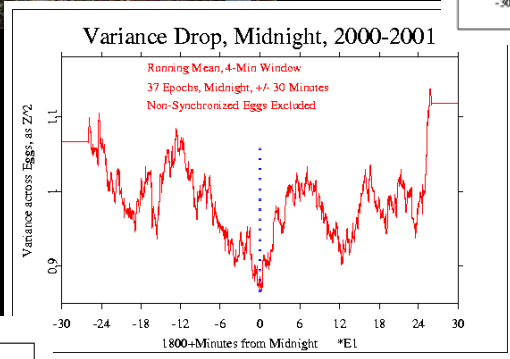
In the first year, 1998-1999, we looked for a change in the average deviation, and compared Maxi- and Mini-celebration time zones.

Then, for the infamous Y2K transition, we looked at a measure of the variability among the eggs and predicted it would decrease as we all focused on midnight.



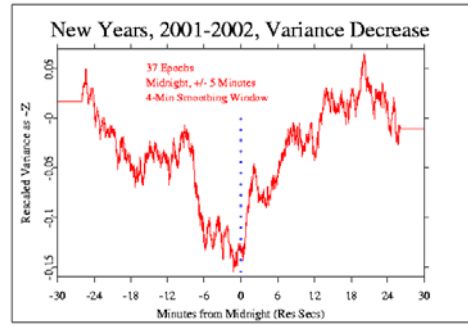


We predicted the same pattern for the following year.

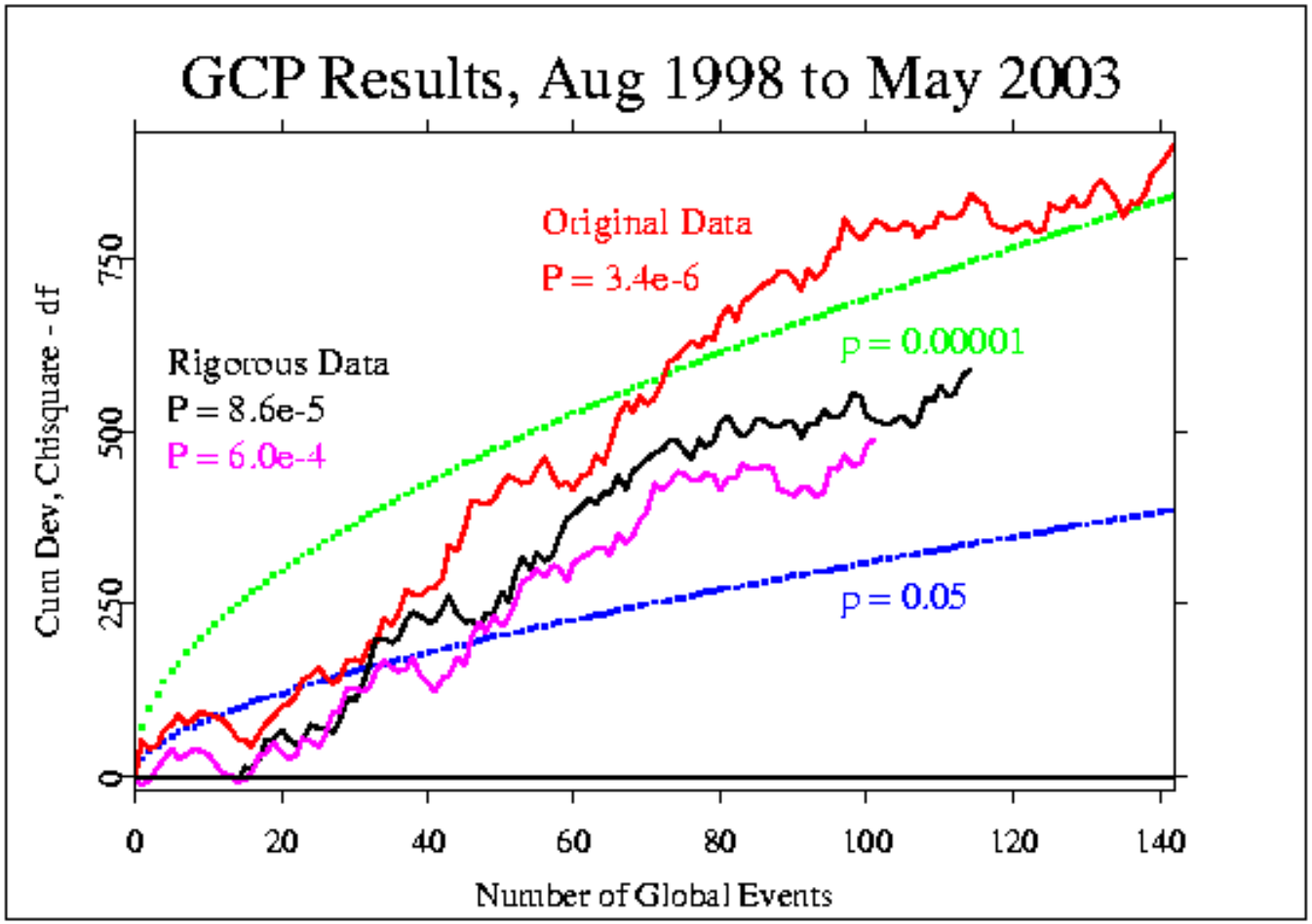


More at http://noosphere.princeton.edu

And again for last year. The pattern is replicated for the third time.



The Bottom Line:
142 global events over 4.5 years
Odds: About 100,000 to 1



Questions we may be Able to address

Geographic nonlocality
Psychological distance
Temporal nonlocality
Experimenter effects
Observer models
Field models
…

What Can We Learn From Mind/Machine Interaction Studies Global Consciousness Experiments?

More generous view of Consciousness

Insights about creative mind

Evidence that we are not isolated

Applications to cultural issues

A psi switch?

But we have work to do

Sharpen and focus our questions

Aim for theoretical understanding


Who holds the flaming brush,
Who touches stylus to the sand,
Who paints thus beauty in the world?
-- Gunnar Rog