Journal of Scientific Exploration, Vol. 10, No. 1, pp. 143–168, 1996 0892-3310/96

Anomalous Organization of Random Events by Group Consciousness: Two Exploratory Experiments

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Abstract — Two experiments explored the hypothesis that when a group of people focus their attention on a common object of interest, order will arise in the environment. An electronic random number generator was used to detect these changes in order. Events judged to be interesting to the group were called periods of high coherence and were predicted to cause corresponding moments of order in the random samples collected during those events; uninteresting events were predicted to cause chance levels of order in the random samples.

The first experiment was conducted during an all-day Holotropic Breathwork workshop. The predictions were confirmed, with a significant degree of order observed in the random samples during high group coherence periods ($p = 0.002$), and chance order observed during low group coherence periods ($p = 0.43$).

The second experiment was conducted during the live television broadcast of the 67th Annual Academy Awards. Two random binary generators, located 12 miles apart, were used to independently measure order. The predictions were confirmed for about half of the broadcast period, but the terminal cumulative probabilities were not significant. A post-hoc analysis showed that the strength of the correlation between the output of the two random generators was significantly related ($r = 0.94$) to the decline in the television viewing audience.

Introduction

When a person is asked to direct his or her attention towards a random system, with intention to mentally influence the stochastic behavior of that system, there is substantial empirical evidence that the system complies (Radin & Ferrari, 1991; Radin & Nelson, 1989). To align its behavior with the person's intention, the random system is usually obliged to move towards a state of increasing order. We can detect this trend because we are specifically looking for negentropic changes in systems with well-understood statistical characteristics.

There is additional evidence suggesting that intentional effects on random systems are independent of the distance between the person and the random system (Dunne & Jahn, 1992), that effects can be detected in so-called silent or hidden physical targets (Berger, 1988), that "bonded" couples working together produce somewhat larger effects than individuals (Dunne, 1991), and that focused attention, without explicit intention, causes changes in remote living systems (Braud & Schlitz, 1989, 1991; Nelson, 1995; Radin, Taylor & Braud, 1995). A related, but somewhat more controversial claim, is that groups of meditators can cause changes in mass social-behavioral indices (Dillbeck, Banus, Polanzi & Landrith III, 1988; Gelderloos, Frid, Goddard, Xue & Lliger, 1988).

As a whole, the cumulative evidence for direct mind-matter interaction (MMI) suggests that the mainstream view of consciousness (an epiphenomenal aspect of brain functioning, or as Francis Crick (1994) tersely put it, "nothing but a pack of neurons") is at best incomplete, and at worst it completely overlooks one or more fundamental properties of consciousness.

Properties of Consciousness

Whatever else consciousness may be, let us propose that it has the following properties, which are derived from a combination of Western and Eastern-oriented philosophies (e.g., Forman, 1994):

- Consciousness extends beyond the individual and has field-like properties.
- Consciousness is negentropic, that is, it injects ***order*** into systems in proportion to the "strength" of consciousness present. This is a refinement of Schrodinger's observation about one of the remarkable properites of life, namely an "organism's astonishing gift of concentrating a 'stream of order' on itself and thus escaping the decay into atomic chaos — of 'drinking orderliness' from a suitable enivironment.... (1967, p. 77).
- Strength of consciousness in an individual fluctuates from moment to moment, and is modulated by something like concentration or focus of attention. Some states of consciousness have higher focus than others. Compared to peak states, mystical states, and other non-ordinary states (Csikszentmikalyi, 1975), we postulate that ordinary awareness has a fairly low focus of attention.
- A group of individuals can be said to have "group consciousness." As in an individual, group consciousness strengthens when the group's concentration or attention is focused on a common object, creating coherence among the group. If the group's attention is scattered, then group coherence is also scattered and any negentropic effects attributed to the group would be reduced.

  In the limiting case, when individuals in the group are all attending to different things, then the group consciousness or coherence strength is effectively zero, producing what amounts to background noise. We assume that maximum degree of group coherence is a function of the total number of individuals present in the group, the strength of their common focus of attention, and other variables including psychological, physiological and environmental factors.

- Everything responds to a consciousness field by becoming more ordered. The stronger or more coherent the consciousness field, the more the order is evident. Inanimate objects (like rocks) will respond to order induced by consciousness as well as animate ones (like people, or the toss of dice), but it is only in the more labile systems that we have the tools to readily detect changes in order.

Following these postulates, we would predict that the stochastic behavior of a random physical system will respond to fluctuations in group consciousness, or coherence, by showing similar fluctuations in statistical order. Note that the random system does not need to be in close proximity to the group, nor does the group even need to be aware that a random system is being monitored. All that matters is that the sequence of random events are ***linked in time*** with the sequence of attentional events in the group.

This postulate overcomes a problem in interpreting what happens in a MMI experiment involving a random number generator (RNG) or any other physical target. The problem may be stated as: How does a physical system targeted by an observer "know" that the observer is focusing his or her attention on it? In the typical experiment where an RNG and the observer are in close proximity, and the observer is presented with real-time feedback about his or her performance (e.g., Jahn & Dunne, 1987), this question usually does not arise because the observer-target link is obvious.

However, the simple assumption that a target responds because an observer is allowed to witness its behavior, which is central to some quantum mechanical models of MMI (e.g., Jahn & Dunne, 1987), breaks down because of empirical evidence suggesting that hidden, unobserved physical targets also respond to mental intention, and that remotely located targets respond as well as targets near the participant, even without feedback.

TOWS: A Model of Mind-Matter Interaction

One solution to the puzzle presented by the existence of MMI in hidden and remote targets is suggested by a common element underlying all MMI studies: Consciousness, specifically the act of attention, is focused on ***an object,*** not necessarily the explicit target object, when MMI occurs. This observation, plus the six postulates listed above, leads to a preposterous model of ***psi*** that we call the "Theory Of the Whole Shebang" or *TOWS.*[1] In this model, mind and matter are the same, that is, ***mind = matter.*** Note that this is not exactly the same as philosophical Identity theory (Churchland, 1984), in which the mind is equal to matter in the sense that matter ***gives rise*** to the mind, or that mind is

[1]The name, TOWS, is a wink at the Holy Grail of physics, the TOE (theory of everything).

an epiphenomenon of matter. Instead, in TOWS mind and matter are equivalent and are bi-directionally causal (as in Sperry, 1987).

That is, the ***matter*** side of the equation is what the cognitive neurosciences and psychopharmacology typically focus on, and what is considered by most neuroscientists to underlie the "explanation" of consciousness (e.g., Crick, 1994; Dennett, 1991). The arrow of causation for them goes in one direction, from matter to mind. The ***mind*** side of the equation is what psychologists and the cognitive sciences typically study. For them the arrow of causation (if the question arises at all) goes from mind to matter. MMI experiments study the rest of the equation, that is, the equals sign.[2]

One of the implications of this equals sign, given that a fundamental property of matter is that it persists across time, is that some aspect of mind (specifically some form of attention) must also persist across time, for according to our postulate, without one the other would not exist. Thus, although the mind equals matter equation appears to be static, TOWS is actually about on-going *processes.*[3]

Returning to the case of an individual who is actively trying to change the behavior of an RNG using mental intention, TOWS says that we see the MMI effect not because the RNG is ***the*** object of focus (the usual assumption), but because (a) the individual had ***an*** object of focus (any would do), (b) the act of focusing consciousness created order which spread out everywhere, and affected everything, (c) the experimenters (E) were able to link the RNG's behavior in time ***with the specific moments*** of the individual's focus, operationally via the experimental design protocol, and (d) E knew how order would be expressed in the RNG, and then measured it.

In the case of hidden and remote RNGs, TOWS offers the same prediction: We see MMI effects because an individual has a specific object of focus, ***and*** we know when the moments of focus occur, ***and*** we know how order manifests in an RNG. We see order even in hidden and remote RNGs because TOWS says that ***any*** RNG, ***anywhere,*** would reveal anomalous order in time-correspondance with moments that consciousness, located anywhere, was focused and coherent. This order would not be casually noticed in measuring instruments world-wide for several reasons, including (a) no one is looking for it, (b) the magnitude of the "imposed order" depends on the degree of consciousness coherence, which is usually quite small, (c) the time-sequence of fluctuations in consciousness coherence must be known to compare against fluctuations in instrument readings, and (d) anyone lucky enough to detect anomalous order would probably interpret it as a random stochastic fluctuation, because there was no obvious local "cause" for the order.

In this article, we describe the results of two experiments exploring the TOWS predictions.

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[2]It would seem by the burgeoning literature speculating on the nature of consciousness that many scientists have ignored the possibility of true equivalence of mind and matter, or think of it as a non-problem, or don't think about it at all.

[3]We thank Michael Ibison for bringing our attention to this matter (no pun intended).

Experiment 1: Altered States Workshop

Holotropic Breathwork™

Holotropic Breathwork is an approach to self-exploration and healing that was developed by psychiatrist Stanislav Grof (1988). Grof used the word "holotropic" to mean aiming for totality or moving towards wholeness. The technique arose out of Grof's early experimentation with LSD as an adjunct to psychotherapy. His study of LSD-facilitated altered states of consciousness led him to a view of the psyche which is radically different from the standard Western view but more compatible with traditional shamanic and mystical perspectives (Harner, 1980).

Grof developed Holotropic Breathwork partially because federal law in the United States in the 1960s severely restricted the legitimate psychotherapeutic use of LSD, and partially because he sought a method of inducing profound inner experiences without the side-effects and addictive dangers of psychoactive drugs. The technique combines insights from modern research on altered states of consciousness, depth psychology, pranayama breathing, and various spiritual practices. The approach mobilizes the innate healing potential of the psyche by invoking non-ordinary states of consciousness.

During a Breathwork session, participants often experience strong emotions and physical tensions which build up to spontaneous release and resolution. The internal experiences have many levels of meaning, including biographical, perinatal, archetypal, and transpersonal. Some of the more dramatic states of consciousness reported include transcendence of space and time, and experiential exploration of alternative realities, such as the classical shamanic worlds (Grof, 1988). The Breathwork technique was selected for this experiment because of its reputation for inducing powerful altered states of consciousness, and for the large energetic effects that are sometimes associated with these altered states.

Method

The Holotropic Breathwork session lasted from 9 AM to 6 PM, Saturday, March 4, 1995, in Las Vegas, NV (USA). Twelve people were present: the first author (DR), two workshop facilitators (one of whom was the third author [MC]), and nine participants. During the morning introduction, DR mentioned that in addition to the normal workshop activities, an experiment would be conducted to see whether shifts in group consciousness might be detected by an electronic device. It was explained that the device produced random noise, and we were postulating that when group consciousness shifted from ordinary to non-ordinary states that those shifts might affect the random noise. Nothing more was mentioned about the experiment.

During the morning session, five participants engaged in Holotopic Breathwork while the four others sat with them. The four "sitters" switched with the "breathers" during the afternoon session. The facilitators and first author watched over everyone during the breathing session and provided guidance as needed.

Data Collection

A computer-controlled, truly random RNG[4] was programmed to generate samples of 400 random bits every six seconds over the entire 9-hour period, resulting in just over 5,500 samples. This RNG, powered by the controlling computer, consists of two independent Zener diode-based noise sources. The two analog outputs of the diodes are converted into digital form, transformed into two independent random bit streams, combined into a single binary sequence, then transmitted to the computer through the serial port in the form of random bytes.

The raw output of each RNG sample was the sum of "1" bits in the group of 400. This number was transformed into a standard normal deviate using the formula $z = (X - 200)/10$, where X was the raw output, 200 was the expected mean, and 10 was the expected standard deviation. Every six seconds, the computer[5] monitor displayed the sample number, the z score for that sample, and a timestamp[6]. The same output was continuously stored to the hard disk. To conserve power, the computer display was instructed to automatically go blank if the keyboard had not been used in the prior three minutes. Data collection continued automatically for the duration of the experiment with no further interventions by the experimenters. The notebook computer and RNG were placed in an unobtrusive spot on a table in the workshop room.

During the session, the first author noted in a logbook whenever an event occurred, to the nearest minute, along with the content of that event. An event was defined as a clear change in the group's activity. As it occurred, each event was assessed as being of high group coherence, such as when the group engaged in meditation, or low group coherence, such as when the group took a lunch break. After the workshop, the third author (one of the facilitators for the workshop) was asked to independently rate the group's coherence for each of the noted events. Her ratings were the same as the first author's.

Approximately every 45 minutes throughout the workshop, the first author glanced at the computer monitor to make sure that data was still being collected properly. For the vast majority of time, the computer just continued to collect data on its own, without observation. After the workshop, an identical data collection period, again lasting 9 hours, was run using the same equipment, alone in a room, unobserved. This data was used as a matching random control sequence.

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[4]Purchased from the Foundation for Fundamental Research on Man and Matter, Amsterdam, The Netherlands.

[5]IBM Thinkpad™ 700 notebook.

[6]Programmed by the first author in Microsoft QuickBasic.

Analyses

To analyze the results, two methods were planned in advance. In each case, the measure of order induced in the RNG was the variance of a sequence of z scores (z as described above), formed as $V = Cz^2$, where V is chi-squared distributed with the same number of degrees of freedom as the number of z scores used in the sum.

There are two simple ways that order might manifest in a random sequence. Recall that in this experiment, a single sample is a sequence of 400 random bits, and a single statistic (a z score) is used to summarize the statistical order in this sample sequence. In the first case, order might affect the random bit stream by producing say, too many Is, resulting in a large deviation from the mean expected number of 1's. This deviation would result in a large z score, and if the same "ordering" trend continued over a series of 400-bit samples, the resulting variance V for that series of samples would be larger than expected by chance.[7] A large V score here means "too much order" for a given collection of samples, or equivalently, unexpectedly high order for a given segment of time.

In the second case, the random bit stream might be affected so as to produce a near-identical number of 1s as Os, possibly by alternating Is and 0s. This would result in z scores near zero, and therefore V for this sequence of samples would be smaller than expected by chance. Thus, a too-small V score also means "too much order" for a given collection of samples.

Both cases require no specific knowledge about the random system to cause them to become ordered, but they do require changing the distribution of bits from truly random into less random. Throughout these studies, we assumed that order would manifest by affecting the random bit stream according to the first scenario, i.e., the RNG was influenced to produce V scores that were too large, thus the probabilities used were one-tailed.

Predictions

- Method *1:* Determine the overall variance of the entire set of 5,500 samples for the experimental (E) and the control (C) datasets.
  Prediction *1:* Variance of the E dataset [hereafter, *V(E)*] will be significantly greater than chance expectation; *V(C)* will be in accordance with chance expectation.
- Method 2: Determine *V(E)* for each event during the workshop. Because the C dataset is the same length as E, determine a matching *V(C)* for each event.
  Prediction 2: Combined *V(E)* variances during events judged to have high group focus or coherence will be significantly greater than chance

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[7]The variance of the random bit sequence within a single "ordered" sample would be smaller than expected by chance, but the statistic V would increase because V relates to sequences of *samples,* not bits.

expectation; combined $V(E)$ variances during events with low group focus will be in accordance with chance. Time-matched "pseudo-events" determined from the C **dataset** will be in accordance with chance, regardless of the type of event.

Results

Result 1. Results of the first analysis, shown in Table 1, confirm the predictions. Overall, $V(E)$ is non-chance and $V(C)$ is in accordance with chance.

TABLE 1

	Experiment	Control
V	5843.15	5425.08
N	5528	5528
z	2.960	−0.979
p	0.002	0.836

Overall results of variance tests for experimental **(E)** and control **(C)** data, where **V** is the variance score, N is the number of samples and degrees of freedom, z is a z-score equivalent for **V** (Guilford & Fruchter, **1973,** p. 517), and p is the one-tailed probability of z.

Result 2. Table *2* summarizes the predictions and the results for high and low group coherence in the experimental and control datasets. The predictions were confirmed.

TABLE 2

Predictions for Group Events Rated High vs. Low Coherent	V	N	z	**p** ***(one-tail)***
$V(E)_{\text{high coherence}} >$ chance	**4485.19**	**4195**	**3.12**	**0.0009**
$V(E)_{\text{low coherence}} =$ chance	**1373.43**	**1333**	**0.79**	**0.215**
$V(C)_{\text{high coherence}} =$ chance	**4167.09**	**4195**	**−0.30**	**0.618**
$V(C)_{\text{low coherence}} =$ chance	**1261.08**	**1333**	**−1.40**	**0.919**

Summary and results for Prediction 2.

Table **3** lists the noted events in detail, the experimenters' assessment of group coherence for each event, and the **V** score for both **E** and C datasets.

TABLE 3

Start of event	End of event	Duration (minutes)	$V(E)/$ $V(C)$	N samples	Coherence Assignment
start session, people entering	begin personal introductions	14.5	155.84 130.94	145	Low
start brief introductions	end introductions	6.1	68.35 39.23	61	Low
discuss Breathwork	begin mediation period	24.8	275.93 235.91	248	High
begin meditation period	bell rings to end meditation	3.0	32.38 22.85	30	High
bell rings to end meditation	begin strech break	2.0	32.34 14.42	20	High
begin stretch break	back in room, settling down	18.8	191.68 198.56	188	Low
back in room, settling down	lights out, prepare for session	6.1	48.56 60.09	61	Low
lights out	begin relaxation instructions	2.1	17.18 18.59	21	Low
begin relaxation instructions	session begins	4.1	44.34 38.67	41	High
first session begins	session ends	150.1	1574.42 1569.21	1501	High
first session ends, begin lunch	lunch break ends	71.6	753.53 672.46	716	Low
lunch over, start second session	session ends	144.1	1517.31 1405.81	1441	High
second session wind-down	group takes a break	27.0	293.88 286.35	270	High
end of break	reconvene group	7.0	72.87 63.58	70	Low
discuss experiences	final remarks	64.4	717.59 593.87	644	High
final remarks	end data collection	7.1	65.42 77.63	71	Low

List of events in chronological order, duration, $V(E)$, $V(C)$, and assessed degree of group coherence.

Discussion: Experiment 1

This experiment confirmed the TOWS prediction that a group engaged in similar-focus, coherent work introduces anomalous order into the environment. During periods in which the group was engaged in high coherence tasks, such as when using the Holotropic Breathwork technique, the RNG output showed an anomalous degree of order. During periods in which the group was engaged in low coherence tasks, such as a lunch break, the RNG output behaved in accordance with chance. The 9-hour control sequence, produced using the same RNG equipment, analyzed using pseudo-events that mimicked events of the same length as those recorded during the workshop, showed that the RNG behaved according to chance expectation throughout the entire control sequence.

There were three TOWS predictions that were not tested in this first study:

- We did not test whether the ordering effect was distance-independent,
- We did not test whether the ordering effect existed everywhere, simultaneously, and
- We did not test whether the effect was independent of the experimenters' expectations. The next experiment was conducted to test the first two predictions listed above.

Experiment 2: Academy Awards Broadcast

Method

Participants. Participants in this experiment were the estimated 1 billion people in 120 countries who viewed the live television broadcast of the 67th annual Academy Awards on March 27, 1995. To assess the fluctuations in group coherence during this broadcast, the experimenters (the first two authors) independently kept minute-by-minute logs of events shown on the broadcast, and both experimenters judged whether they thought each noted event was interesting and would attract the attention of the viewing audience, or uninteresting and likely to bore the audience. We called the interesting, high focus, high attention segments "high coherence," and the uninteresting, low focus, boring segments "low coherence."

Data Collection. Two truly random number generators (RNGs[8]) were used as the physical targets. One was located in the first author's home as he watched the television broadcast (call this RNG,), and the other was alone in one of the laboratory suites of the Consciousness Research Laboratory at the University of Nevada (call this RNG,). Both RNGs were programmed to produce a continuous 6-hour sequence of truly random bits, generated in samples of 400 bits, once every six seconds.[9] This resulted in two independent random

[8] Obtained from the same source and identical in function to the RNG used in the first experiment.
[9] Programmed by the first author using Microsoft QuickBasic.

sequences of 3,600 samples each. The first and second authors simultaneously started both RNGs about two hours before the 3.5 hour television broadcast, and both RNGs continued to collect data continuously up to about a half-hour after the broadcast ended.

As in the first experiment, the raw output of each RNG sample was the sum of "1" bits in the group of 400 random bits. And as before, this number was transformed into a standard normal deviate or z score. The controlling computers" displayed the sample number, z score, and a timestamp for each sample, and the same outputs were continuously stored to hard disks. No feedback about the behavior of the RNGs was provided to the experimenters during the entire data collection period. Immediately after the 6 hour experimental dataset was recorded, another 6-hour sequence was run as a control using RNG,. The RNG/computer system was programmed to operate alone and unobserved in the same place it was located during the broadcast.

Hypothesis 1. The main hypothesis was that the variances of the two experimental random data streams would be significantly deviant during those events during the broadcast judged as high coherence, and in accordance with chance during events judged as low coherence events. Moreover, we expected that a random control sequence [C], also 6 hours in length, would be uniformly in accordance with chance when matched in time with both pseudo-high coherence and pseudo-low coherence events of the same length as recorded during the actual broadcast.

The main statistic was the variance of a sequence of z scores produced by each RNG, V as described previously. We use the notation V_x for the variance produced by RNG,. Thus,

Prediction 1. V_a and V_b for broadcast events judged as high coherence would be significantly deviant from chance expectation, while V_a and V_b for broadcast events judged as low coherence would be in accordance with chance. V_c for pseudo-events matched in time to the length of the original high and low coherence events would be in accordance with chance.

Hypothesis 2. The second hypothesis was that the statistical behavior of the two independent RNGs would be affected in the same way, at the same time, due to the TOWS prediction that order is simultaneously created everywhere, with the degree of order fluctuating in strength according to the focus of attention of the viewing audience. Thus,

Prediction 2. The correlation between time-matched RNG outputs, using V_a and V_b, would be significantly positive. Time-matched "pseudo-events" between V_a and V_c, and V_b and V_c, would produce chance correlations.

Results

Assignment of Coherence. Table 4 lists the events recorded by the experimenters during the broadcast and the accompanying subjective assignments of high and low audience coherence. Table 4 shows that the second author noted

[10]IBM Thinkpad™ 700 notebook and Dell Optiplex 486DX2/66.

TABLE 4

Time (PST)	Broadcast Event	JMR rating	DIR rating	Coherence Segment #
6:02	Opening scene	High	Low	Low 1
6:04	Director of Motion Picture Academy speaks	Low	Low	
6:08	Scenes of films	High	Low	
	Singing, opening number	Low	Low	
6:12	Introduction of David Letterman	High	High	High 1
	Boystown joke	Low	High	
	Schwarzenegger joke	High	High	
	Clip of hailing cabs	Low	High	
	Talking with cab drivers	High	High	
	Taxi Jokes	Low	High	
6:23	Announce supporting actress	High	Low	Low 2
	Thanking people	Low	Low	
6:34	Letterman talking	High	High	High 2
6:35	Keanu presents first nominated film	High	High	
	Renee Russo introduces 1st song	Low	High	
	Randy Newman singing	Low	Low	Low 3
6:41	Commercial	Low	Low	
6:45	Return to program	Low	Low	
	Clips of comedians in films	High	Low	
	Presents make-up award	Low	Low	
6:51	Letterman unrolls rug with Hanks	High	High	High 3
	Sound effects presentation	Low	High	
	Acceptance speeches	Low	Low	Low 4
6:55	Steve Martin	High	High	High 4
	Winner's thank you's	Low	High	
6:58	Commercials	Low	Low	Low 5
	Return to program	High	Low	
7:03	Letterman announces Anna Pacquin	High	High	High 5
	Thank yous	Low	High	
7:08	Matt Dillon nominated song	Low	Low	Low 6
7:11	Oprah Winfrey	High	High	High 6
	Quincy Jones clips	Low	High	
	Quincy Jones talking	High	High	
	Quincy Jones plea for NEA funding	Low	High	
7:18	Commercials	Low	Low	Low 7
7:22	Paul Newman	High	Low	
	Winner: Legends of the Fall	Low	Low	
7:29	Tim Allen	High	Low	
	Oscar presented to British actor	Low	Low	
7:33	Bugs Bunny & Daffy Duck	High	High	High7
	Oscar to Bob's Birthday	Low	Low	Low 8
7:39	Gregory Peck presenting	High	High	High 8
	Letterman announcing Saradon & Robbins	Low	High	
	List of nominees	Low	Low	Low 9
7:45	Steven Segal presenting	Low	High	High 9
	Oscar to Forrest Gump	Low	Low	Low 10
	Acceptance speech	Low	Low	
7:48	Letterman	High	High	High 10
7:54	Start singing "Circle of Life"	Low	High	
8:00	Commercial	Low	Low	Low 11
8:09	Letterman's Janet Reno joke	High	Low	
	Ellen Barkin presents nominees for Sound	Low	Low	

TABLE 4 (continued)

Time (PST)	Broadcast Event	JMR rating	DIR rating	Coherence Segment #
8:13	Nicholson presents honorary Oscar	Low	Low	
	Film Clips	Low	High	High 11
8:18	Commercial	Low	Low	Low 12
8:21	Letterman	High	High	High 12
	Comedy clips	High	High	
8:23	Hugh Grant and Andie McDowell	Low	Low	Low 13
8:31	Letterman	High	Low	
8:36	Commercial	Low	Low	
8:40	Sylvester Stallone presents	High	Low	
8:43	Annette Benning	High	High	High 13
	winner Elton John	High	Low	Low 14
8:46	Screen writing	High	Low	
	Winner Pulp Fiction	High	High	High 14
8:55	Commercial	High	Low	Low 15
8:57	Letterman	High	High	High 15
	Irving Thalberg award	Low	High	
	Clint Eastwood clips	High	High	
9:00	Clint Eastwood accepts	High	High	
9:04	Tom Hanks presents best actress	High	High	
	Acceptance	Low	Low	Low 16
9:13	Denzel Washington	Low	Low	
	Shawshank Redemption	Low	High	High 16
9:15	Holly Hunter	High	High	
9:21	Steven Spielberg	High	High	
	Winner Zimeckis	Low	High	
9:25	Commercials	Low	Low	Low 17
	DeNiro and Pacino	High	High	High 17
	Winner Forrest Gump	High	High	
	Sign off			

Time, events, subjective assessments, and joint assessments (see text).

subjective changes in the broadcast somewhat more frequently than the first author.

The two subjective assignments of audience coherence were combined into a single assignment in the following way: We assumed that because the broadcast had a massive audience, there would be some statistical inertia in the group's attention and interest levels. That is, we assumed that from the perspective of an "average audience," periods of high entertainment, attention, and focus would persist through brief moments of lesser interest. For example, say for ten full minutes the program held the audience's interest. If at this point the interest level dropped off for 30 seconds or so, the audience as a statistical entity would probably maintain its general interest, hoping for something more interesting to happen. Thus, for each event e and corresponding subjective coherence assignments a_1 and a_2 as noted by the two experimenters (assignments coded as 1 for high and 0 for low), we created a single average coherence value consisting of the average of three values: a_1 and a_2 for event e plus the previous average assignment for event $e - 1$.

This simple method smoothed out rapid changes in estimated audience coherence. The resulting mean coherence for each event was then transformed into a joint coherence assignment by calling it high coherence if the coded mean for that event was greater than 0.5, and calling it low coherence if the coded mean for that event was less than or equal to 0.5. Table 5 illustrates how the experimenters' original assignments of coherence were coded into a new, inertial-smoothed joint estimate of audience coherence.

TABLE 5

JMR Coherence	DIR Coherence	JMR code	DIR code	Mean Coherence	New Joint Estimate
High	Low	1	0	0.50	0
Low	Low	0	0	0.17	0
High	Low	1	0	0.39	0
Low	Low	0	0	0.13	0
High	High	1	1	0.71	1
Low	High	0	1	0.57	1
High	High	1	1	0.86	1
Low	High	0	1	0.62	1

Translation of original audience coherence estimates into smoothed estimates. The first mean coherence estimate, shown in the first line as 0.50, is the average of JMR's assessment of High coherence (1) and DIR's assessment of Low coherence (0). This 0.50 average is coded into 0 to form the combined estimate of Low coherence for the first event. The next estimate is the average of the first event's estimate of 0.50, plus JMR's assignment of the second event and DIR's assignment of the second event. This results in 0.17. which is coded into 0.

Agreement between the two experimenters' original audience coherence assignments ($N = 84$ events) resulted in a correlation of $r = 0.29$, $p = 0.004$, indicating a fair degree of agreement between the two authors' subjective feelings about the broadcast. Correlation between the new, inertial-smoothed joint estimates of audience coherence and the original assignments resulted in $r = 0.45$ for the second author and for $r = 0.84$ for the first author. Of the 84 events, there were seven cases where the joint subjective assignments differed from the first author's assignments. Because of the close agreement between the first author's original assessments and the new joint assignments, we decided for the sake of simplicity to use the first author's assignment of events and audience coherence in the primary analyses.[11] This resulted in a total of 17 periods of alternating low and high coherence periods, with the sample lengths of the various periods shown in Table 6.

Result 1. Figure 1 shows three curves: (1) The cumulative probability of the variance V for RNG, for the entire sequence of 3,600 samples, (2) the cumulative probability of V for periods assigned as High audience coherence, and (3) the cumulative probability of V for periods assigned as Low audience coherence. The High/Low curves begin at the start of the television broadcast, about

[11]This decision simplified the analysis but it also introduced a confusion about the source of the results: Were they due to the first author, or to mass consciousness? We address this issue later in more detail.

TABLE 6

Low Coherence Sample Length	High Coherence Sample Length
119	110
120	30
130	30
10	49
30	50
30	70
150	30
30	30
30	30
9	110
140	40
30	20
199	30
30	60
20	110
60	110
30	60

Length of events, in samples of 6 seconds each. Thus 120 samples equals 12 minutes. Note that the actual sequence of events alternated between assignments of low and high coherence, beginning first with a low coherence event (119 samples), then a high coherence event (110 samples), and so on until the last high coherence event (60 samples). The cumulative time sequence was 2,136 samples, or about 3 hours, 33 minutes.

two hours after the beginning of the data recording (sample 1,048), and stop at the end of the broadcast (sample 3,184). This figure shows that the cumulative variance was more deviant (i.e., resulted in a lower probability) during the periods of high audience coherence compared to low audience coherence, although the terminal probability of the high coherence segments does rise above the $p < 0.05$ level just before the end of the broadcast.

The High/Low curves in Figure 1 display gaps because any given period of time during the broadcast was exclusively either assigned as High or as Low audience coherence. Thus, although the High/Low curves appear to overlap at times, this is an illusion caused by the limited resolution of the markers on the graph.

Figure 2 shows the same information as in Figure 1 for the output of RNG,. This graph shows that overall the cumulative variance was more deviant during high coherence segments compared to the low coherence segments, at least up to about sample 2,700, when the probability of the variance for the high coherence segments drifted well beyond the $p < 0.05$ level.

Figures 3 and 4 summarize the same information shown in Figures 1 and 2, showing only the cumulative probabilities of the RNG variances for periods of High and Low audience coherence. The 17 events in these figures relate to the 17 High audience coherence and 17 Low audience coherence segments listed in Table 4. Figure 5 shows the cumulative probabilities of the control sequence variances for 17 pseudo-high and pseudo-low coherence periods.

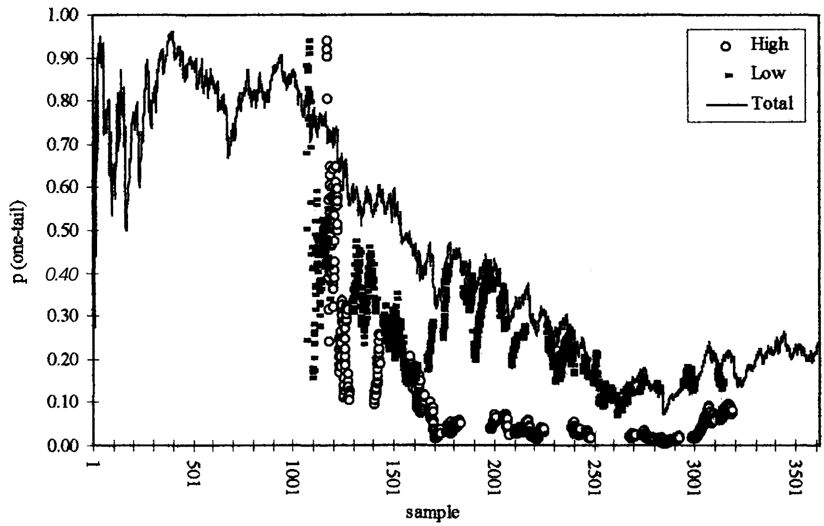

Fig. 1. Cumulative probability of variance in RNG, for complete **dataset** and for segments of subjectively assigned high and low audience coherence during the television broadcast. The cumulative probability for the high and low events begins to cumulate at sample 1,048.

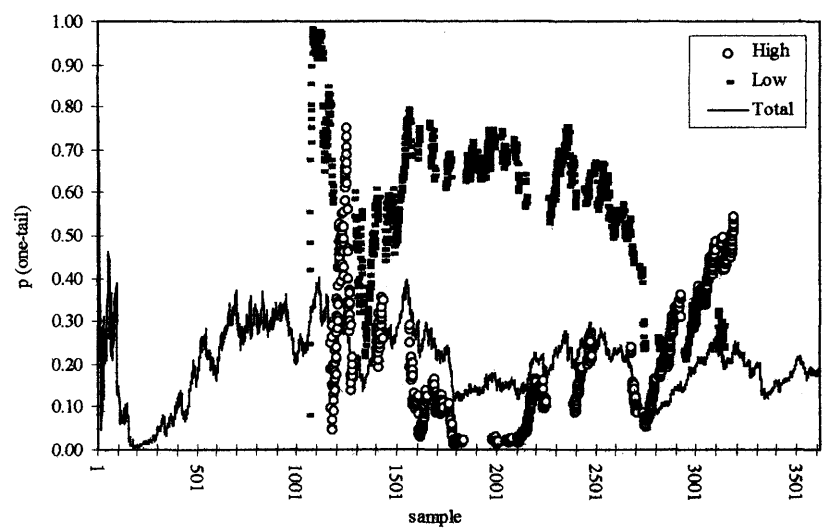

Fig. 2. Cumulative probability of variance in RNG, for complete **dataset** and for segments of subjectively assigned high and low audience coherence during the television broadcast.

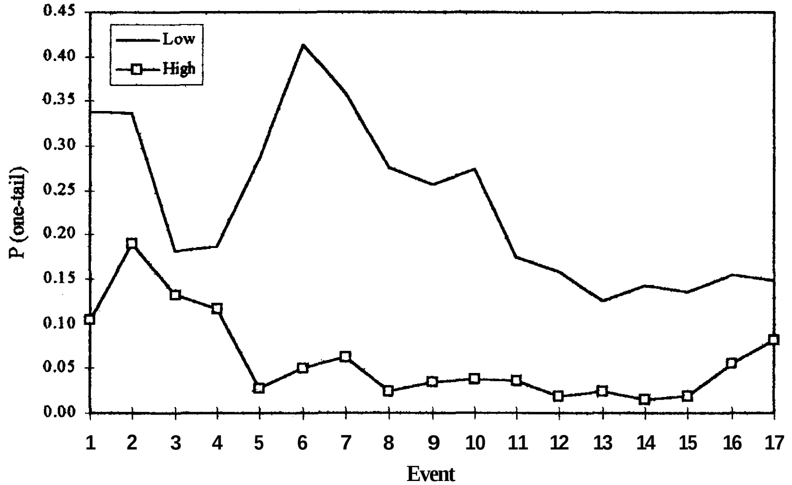

Fig. 3. Cumulative probability for high and low coherence events in RNG, .

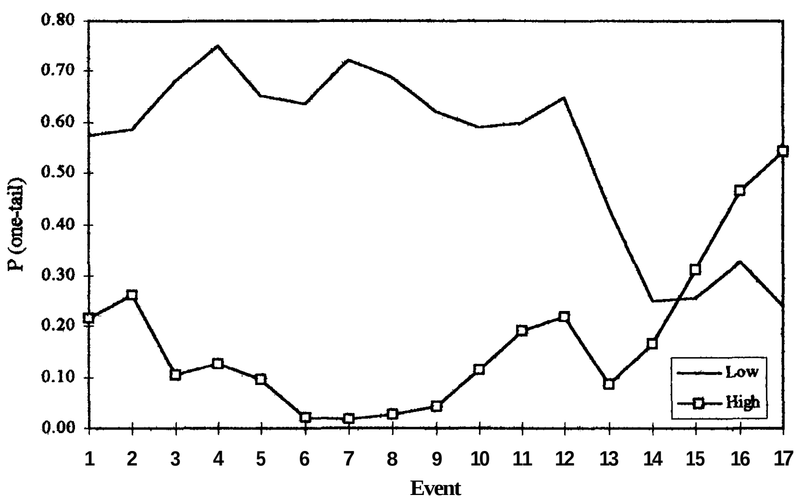

Fig. 4. Cumulative probability for high and low coherence events in RNG,.

The above analyses were performed using the subjective assignments of the first author. To see whether the same results would obtain using the joint assignments developed from both authors' subjective assessments, the same analyses were conducted again. The joint assignments resulted in a total of 13 high and 13 low coherence periods, and the overall result (combining the cumulative probabilities from both RNG_a and RNG_b) is shown in Figure 6. Analysis of control data showed results that were essentially as those seen in Figure 5. Because the joint assignment analysis was virtually indistinguishable from that using the first author's assignments, the next analysis was conducted using the latter assignments to increase the number of datapoints in the correlation.

Result 2. Prediction 2 was that the correlation between V_a and V_b during time-matched events would be significantly positive, while time-matched "pseudo-events" between V_a and V_c, and V_b and V_c, would be at chance levels. To create this correlation, a chi-square variance measure was formed for each of the 17 low and high coherence events, these measures were transformed into standard normal deviate z scores, then a weighted z score was formed for each event as $w = z$ N, where N was the number of samples.

Weighted z scores were used to reflect the fact that the events were of different time lengths. The correlation was calculated between the 34 RNG_a weighted z scores versus the 34 time-matched RNG_b weighted z scores. The null hypothesis predicts a correlation of zero. Figure 7 shows the resulting correlation, $r = 0.28$, $t = 1.65$, $df = 32$, $p = 0.05$ (one-tail). The equivalent correlations between the matching control sequence RNG_c and RNG_a, were $r_{ca} = -0.19$, $p = 0.13$, and between RNG_c vs. RNG_b, $r_{cb} = -0.09$, $p = 0.32$. Thus, as predicted, there was a significant correlation between the two independent RNGs running during the television broadcast, and no significant correlations between the matching control RNG sequence and either of the two experimental RNG outputs.

Another way to examine the correlation between the two RNGs is to calculate the cumulative probability of the correlation between RNG_a and RNG, over the course of the broadcast. This correlation is formed between all individual samples in RNG_a and RNG_b per event (e.g., there were 119 samples in the first event, which was Low coherence, as shown in Table 6), and then after a separate correlation is formed for each event, a cumulative correlation is calculated along with its corresponding probability. Figure 8 shows the result, which suggests that the cross-RNG correlation during the high coherence periods was significant up to about event 10, and then the correlation broke down. The correlation during the low coherence periods was not significant at any point.

Discussion: Experiment 2

Both predictions were confirmed for approximately the first half of the television broadcast, partially supporting the TOWS model proposal that moments

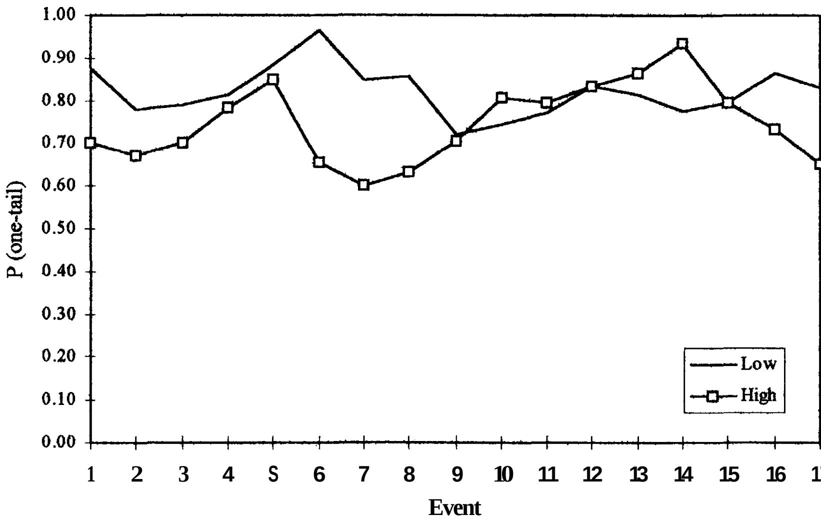

Fig. 5. Cumulative probability for pseudo-high and pseudo-low coherence events in the control RNG.

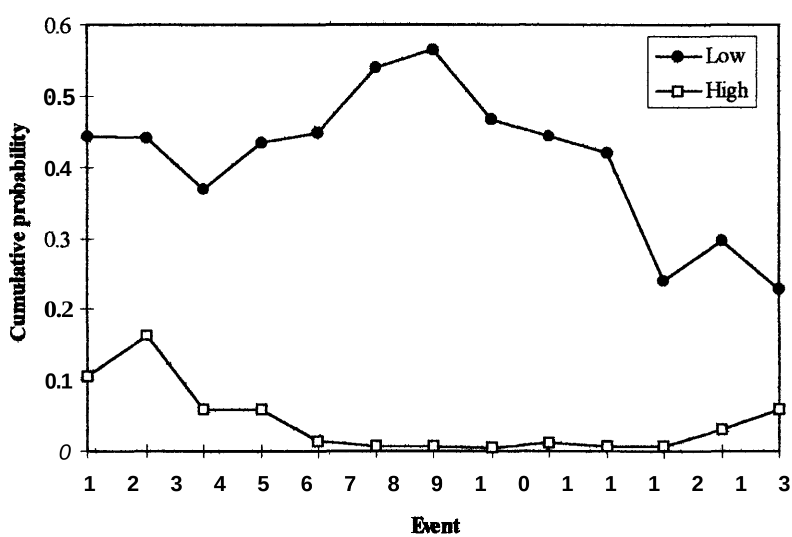

Fig. 6. Cumulative probability for the 13 joint subjective assessment events, for both RNGs combined.

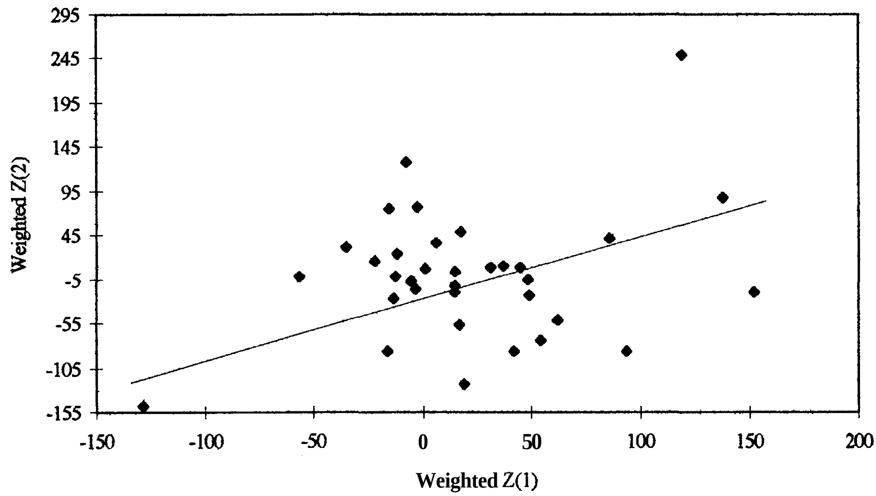

Fig. 7. Correlation between weighted z scores in RNG_a and RNG_b.

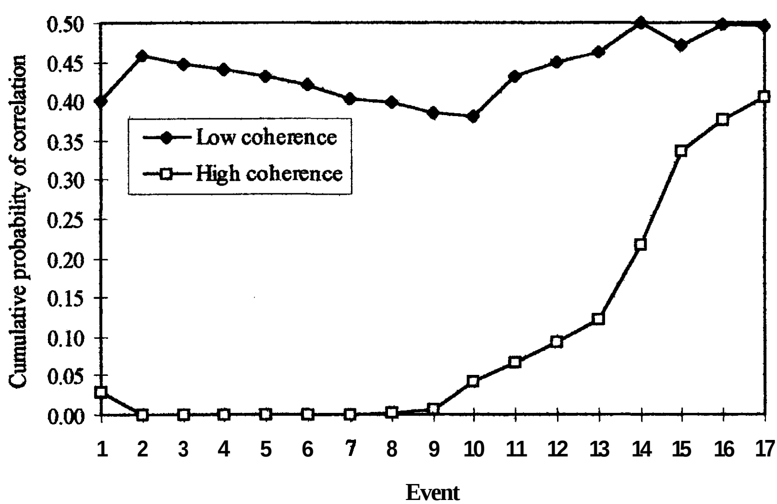

Fig. 8. Cumulative probability of correlation between RNG_a and RNG_b for Low and High coherence periods. The smallest cumulative probability is $p = 0.0001$ at event 4.

of ***coherent attention*** among one billion people introduced an anomalous degree of ***order*** into the environment. This order was detected by two independent RNGs, operating autonomously, without feedback, and located 12 miles apart. Comparison with a matched-length control sequence showed no tendency for the RNG variances to drift from chance or to exhibit unexpected cross-correlations.

When we presented the results of this experiment at a conference,[12] we speculated that the declining correlation between the two RNGs during the high coherence periods (shown in Figure 8 as a rise in cumulative probability), and the drift towards chance variances in the individual RNGs (as shown in Figures 3 and 4), might have been due to the fact that the television audience for the Academy Awards declined over the course of the broadcast.

After presenting this speculation, someone in the conference audience suggested that we could test the "declining number of people" postulate by obtaining the Nielsen TV ratings for the Academy Awards broadcast (Beville, 1985). We thought this was a good idea, because the TOWS model postulates that the strength of the ordering effect is a function of both the degree of common focus in a group ***and*** the number of people in the group (among other variables). Therefore, we contacted ABC Research in New York City and obtained the half-hourly Nielsen ratings for the broadcast.[13]

To test the possible effect of the changing audience size during the broadcast vs. the degree of order simultaneously detected by both RNGs, we calculated two correlations: The first was between the broadcast ratings per half-hour vs. the natural log of the cumulative probability of the cross-RNG correlations during high audience coherence. The second was the same except for the low audience coherence time periods. We used the natural log of the cumulative probability to help normalize the probability (because the range of cumulative probability was so skewed, as seen in Figure 8).

Results of the correlation for the high coherence periods, shown in Figure 9, were surprisingly strong, $r = 0.934$, $p = 4.1 \times 10^{-8}$. A similarly evaluated correlation for the low coherence periods, shown in Figure 10, resulted in an unremarkable $r = -0.185$, $p = 0.476$. These correlations suggest, post-hoc of course, that the size of the group may be related to the magnitude of the ordering effect.

General Discussion

Time-Shifted Control Test

To test the possibility that our analysis methods might have spuriously created periods of deviant variance in the random sequences, we calculated what would have happened in the Academy Awards experiment if we had started

[12] The 14th Annual Meeting of the Society for Scientific Exploration, Huntington Beach, CA, June 1995.

[13] The Academy Awards were broadcast in the United States by the ABC TV network. We thank Besty Rella at ABC Research for providing us with the Nielsen ratings data.

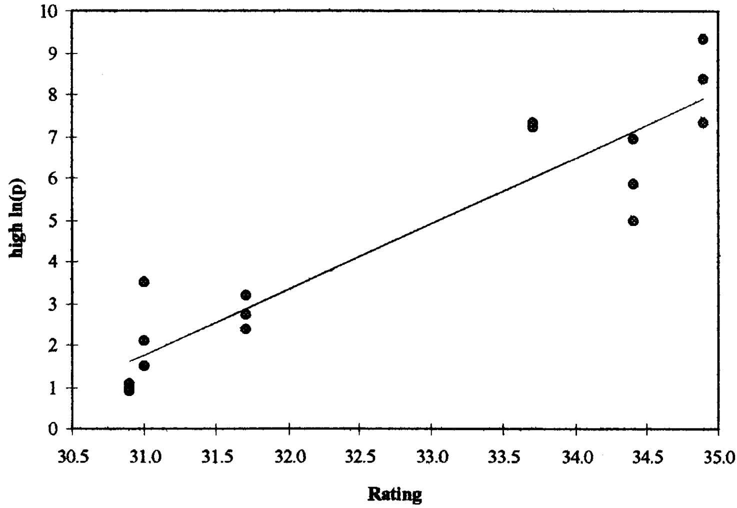

Fig. 9. Correlation between the half-hour Nielsen rating of the Academy Awards broadcast vs. the natural log of the cumulative cross-correlation between the two RNGs during periods of high audience coherence, $r = 0.934$, $p = 4.1 \times 10^{-8}$.

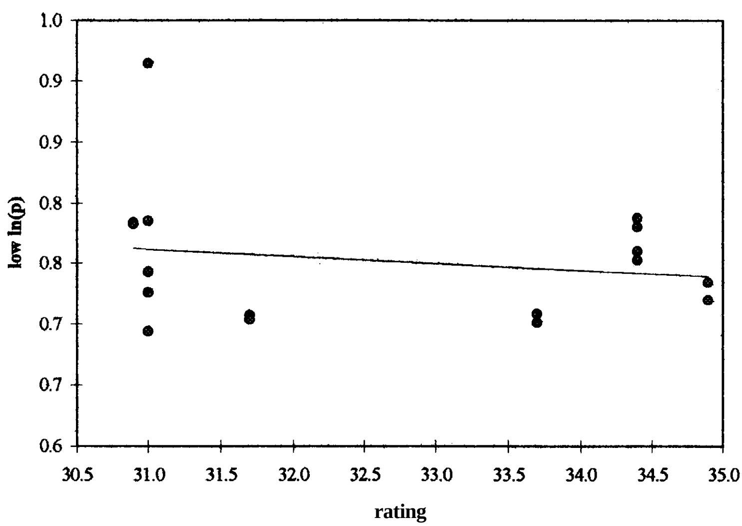

Fig. 10. Same correlation as in Figure 9, for periods of low audience coherence, $r = -0.185$, $p = 0.476$.

recording data 90 minutes *later* than when we actually began. To do this, we shifted the original dataset 900 samples ahead, matched it against the original time-course assignments of high and low audience coherence, and recalculated the cumulative probabilities. Figures 11 and 12 show that for both RNGs, neither of the cumulative probability curves reached a significantly deviant level at any point.

This post-hoc control suggests that the experimenters' assessments of high and low audience coherence, in their *original* time sequences, was an important factor. This is in accordance with the TOWS hypothesis that the RNG output variances were influenced by on-going, real-time fluctuations in mass attention.

An Extravagant Speculation

Given the field-like, extended properties of consciousness postulated by TOWS, ordering effects produced by mental coherence should include the group comprised of all consciousnesses on Earth (and presumably beyond, but that is untestable). Thus, when we monitor labile systems that are exquisitely sensitive to changes in entropy, such as truly random RNGs, in a way what we are observing is the electroencephalogram (EEG) of the "mind of Gaia" (Lovelock, 1979). Under ordinary circumstances, Gaia's consciousness is scattered, its attention distributed over billions of different objects. Gaia's normal EEG is thus essentially random, and the billions of tiny ripples of order created by Gaia's elemental consciousnesses remain unsynchronized. Any random sequence observed in any RNG, anywhere, will look like background noise.

Just as a billion poorly reflecting mirrors may cast a greater light than one tiny shard, a billion minds may reflect more of the Mind of Gaia than one single mind. As each mind twinkles and glitters over the course of day, each moment of coherence in each mind affects all other minds and all matter, but collectively the six billion human minds (and countless animal and plant "minds") on Earth cast no more than a soft glow, reflecting the usual condition of randomly aligned mirrors.

Tows speculates that under exceptional circumstances, when many minds are focused on the same object, unbeknownst to the individual minds a momentary grand alignment occurs. During these brief, shining moments, the fractured mirror reassembles into Gaia's Mind, and the unity of Mind-Matter is brilliantly manifest. At such uncommon times, Gaia is in effect, awakened, and strange things may occur. One wonders if something like this may be responsible for unusual, large-scale anomalies such as the simultaneous sighting on May 13, 1917, of the Virgin Mary, at Fatima, Portugal, by tens of thousands of witnesses (including skeptics). One also wonders what impact global television may have on present and future world events; after all, what used to be exceptionally rare moments of global coherence are now commonplace through live planetary-wide broadcasts. Today the majority of the Earth's

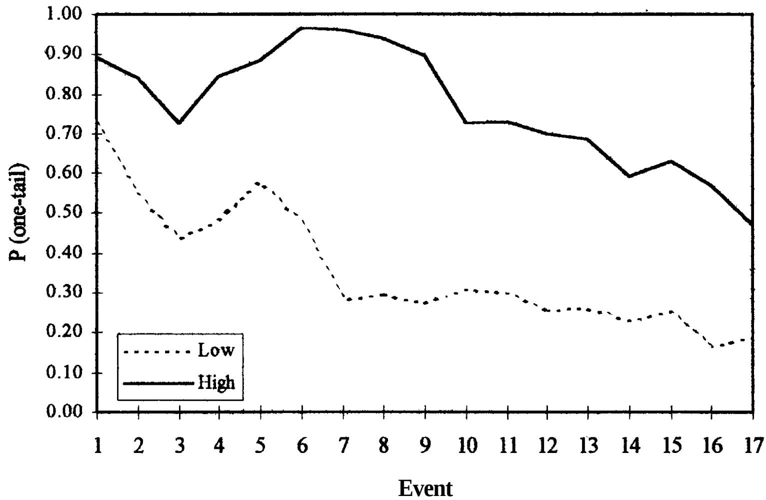

Fig. 11. Control test for RNG, after shifting equivalent of 90 minutes into the future.

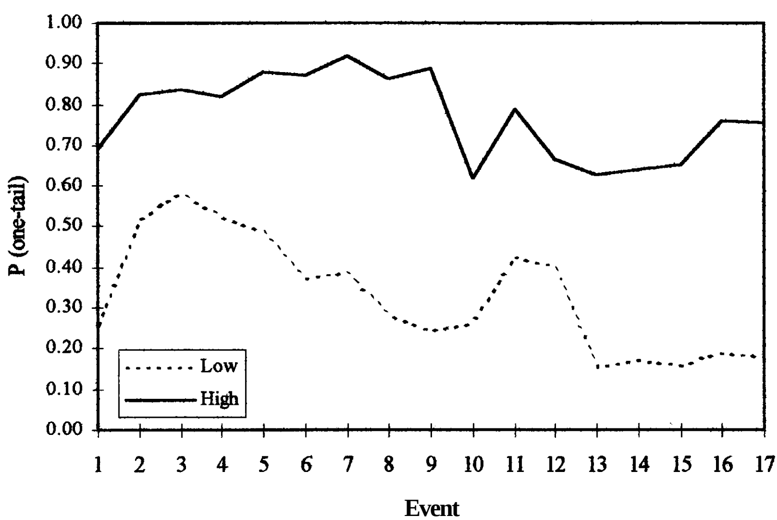

Fig. 12. Control test for RNG, after shifting equivalent of 90 minutes into the future.

population can participate in a single object of focus, for extended periods of time. Does this portend Gaia's awakening?

Next Steps

The present experiments did not attempt to test many important elements of TOWS. For example, experiments must be conducted to eliminate experimenter expectancy effects as a possible cause of the anomalous ordering effect. Better subjective and more objective ways of measuring group coherence should be explored. In its initial formation, other than providing operational descriptions, TOWS is deficient in not providing explicit definitions of either "order" or "group coherence." TOWS cannot easily account for ***directional*** effects in MMI, although perhaps TOWS can be poetically thought of as describing the orderly wakes produced by the vessel of attention, sailing through an ocean of chaos, and ***steered*** by intention.

In addition, a wide variety of MMI-type anomalies studied in the laboratory such as retroactive MMI effects (Schmidt, 1987), and observed in the field such as poltergeist events (Roll, 1977), are not clearly accommodated by TOWS. Finally, it is not clear how TOWS might account for perceptual anomalies such as telepathy (Bem & Honorton, 1994).

Clearly many more replications of this sort of experiment are necessary. While TOWS may be way off the mark, it is interesting that the present experiments, the "field random event generator" studies by Nelson (1995), and a corroborating study by Blasband (1995), all provide evidence suggesting that random physical systems can be unintentionally affected by both individuals and by groups.

Conclusion

The experiments described here suggest that (a) focused attention orders random events, (b) the effect of this ordering extends remotely, (c) the strength of the ordering effect increases when many individuals focus on the same object, even without explicit instructions to create order, and (d) the order is detectable as predictable fluctuations in the behavior of truly random events. These results viewed in conjunction with substantial previous evidence supporting the existence of direct mind-matter interaction in laboratory tests, as well as recent corroborating studies on consciousness "field effects," suggest that consciousness extends beyond the body, and that mind may be more than "nothing but a pack of neurons" (Crick, 1994).

Acknowledgments

We thank the Bigelow Foundation for its continuing support of the Consciousness Research Laboratory, and Roger Nelson, York Dobyns and Michael Ibison of the Princeton Engineering Anomalies Research Laboratory for valuable comments on an early version of this paper.

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