BURSARIES FOR SCIENTIFIC RESEARCH

Application Form

"Enhancement of the Global Consciousness Project"

2008 / 2009

I. INVESTIGATION TEAM

A. Project Leader

Identification

Name: Dr. Roger Nelson
Date of Birth: 10 March 1940
Place of Birth: Broken Bow, Nebraska, USA
Nationality: USA
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Affiliated Institution

Institution: Princeton University, Retired; Global Consciousness Project
Appointment: Director, GCP; Extended Faculty, Institute of Noetic Sciences
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Curriculum vitae

NAME AND ADDRESS
Roger D. Nelson
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PERSONAL
Born 1940, Broken Bow, Nebraska
Married 1967 to Reinhilde Luedtke
One son, Gregory, born 1969

EDUCATION
Ph.D. Experimental Psychology, New York University, 1972
Research Fellow, Columbia University, 1970-1972
B.A. University of Rochester, Rochester, NY, 1962
Psychology, Mathematics, Physics

EMPLOYMENT
1997 - Present: Director, Global Consciousness Project
1980-2002: Princeton University, Princeton Engineering Anomalies Research
1972-1980: Johnson State College, Johnson Vt., Tenured Professor

PROFESSIONAL AFFILIATIONS
Alternative Therapies in Health and Medicine, Advisory Board
American Association for the Advancement of Science
American Psychological Association
NIH Office of Alternative Medicine, Consultant
Parapsychological Association, Board of Directors
Society for Scientific Exploration, Councillor

B. Project team

Researcher 1

Name: Roger Nelson

Academic Degrees: BA, PhD, Experimental Psychology

Institutional Affiliation: Princeton University, Retired

Appointment: Director

Researcher 2

Name: Peter Bancel

Academic Degrees: BS, Physics, Bowdoin College, Brunswick, ME, USA;
PhD, Physics, University of Pennsylvania. Philadelphia, PA, USA.

Institutional Affiliation: GCP Analysis Project, Paris, France

Appointment: Analyst

Researcher 3

Name: Paul Bethke

Academic Degrees: MS Computer Science

Institutional Affiliation: Self Employed

Appointment: Programming Consultant, Windows OS and Networking

Researcher 4

Name: Greg Nelson

Academic Degrees: MS Computer Science

Institutional Affiliation: Princeton Gamma Tech, Princeton, NJ, USA

Appointment: Programming Consultant, Linux OS, Database, Networking

Summary

The Global Consciousness Project (GCP) is an international experimental collaboration established to study the interaction of collective human consciousness and the environment. The project maintains a network of physical Random Number Generators (RNGs) located at widely distributed sites around the world. Data trials from the RNGs are collected continuously and archived to a database via the Internet. The GCP network has been in operation since August 1998 and currently comprises over 65 random sources.

The database of synchronized, random trials is used to investigate mind-matter interactions on a global scale. The project hypothesizes that the emergence of collective attention at the time of major world events will correlate with deviations from chance expectation in the variance of the network data-stream. These anomalous correlations operationally define what the project refers to as Global Consciousness. After 10 years of operation, the experiment finds a highly significant p-value ($<10^{-6}$) for periods corresponding to more than 250 pre-determined global events.

An extensive four-year analysis program has determined that the experimental results are robust against re-sampling and simulation tests relative to the null hypothesis. The analyses also find significant evidence of anomalous spatial and temporal structure in the data that provides support for the hypothesis independent of the formal experimental result. A key finding is that distance dependences in the observed global correlations indicate how the network can be improved in order to enhance measurement of this extremely subtle effect.

This proposal is to fund a two-year program to implement a major enhancement of the GCP data network and initiate a refinement of the operational definition of Global Consciousness. Our goal is to increase the sensitivity of the network capabilities in order to distinguish between competing theoretical conceptions of Global Consciousness. An integral aspect of the proposal entails a simultaneous upgrade of the database structure to include parallel data sequestration. This will extend experimental design capabilities to include exploratory analysis and hypothesis testing on parallel data-sets (data-splitting).

Project Conception and Background

Progress in modern science has often been driven by advances in instrumentation. Novel instruments inspire creative approaches to experimental study of the universe and its innumerable complexities. Phenomena as diverse as galaxy formation, gene expression, quantum entanglement, terrestrial climatology and human cognition, which have yielded to ever more precise experimental study, would remain beyond our understanding without the aid of new instruments to extend the limits of human observation.

A compromise underlying these gains is a willingness to recuse the observer as an object of experimental study. An indication of real progress is that many disciplines increasingly view this stance as neither necessary nor desirable. In recent decades, a quiet revolution has led scientists across many disciplines to ask how mind can be brought into the purview of experimental science. At issue is how to integrate the insights of physical and neurological sciences with the evident fact of mental experience and how this may be studied experimentally.

Psi research is interesting in this regard because it directly investigates the connection between physical and mental phenomena, while challenging our understanding of each. Psi phenomena can be framed in two ways: as anomalous perception, by which an individual accesses information inaccessible to the ordinary senses, or as anomalous physical behavior, in which measured deviations from expectation in physical systems remain unexplained by physical models. Anomalous perception, such as telepathy or remote-viewing often involves a pair of subjects, and a simple conception of positive outcomes is that the anomaly involves an access or sharing of mental contents between the subjects. Similar experiments using a single subject and an external target of some kind suggest that the reach of anomalous perception may extend to the environment in a general way (Radin, 2004).

The second pole of psi research, which is the subject of this proposal, investigates how psi manifests in the physical domain. One successful experimental approach posits that the behavior of stable, truly random (typically quantum) systems can be altered by the directed intention of human agents. In a typical experiment, a subject will spend some minutes in the presence of a random number generator, often while receiving a sensory feedback of the device output, and mentally “intend” to alter or bias the output in some predetermined way.

A research effort of reference is a 12-year study (Jahn et al., 1998) carried out by the Princeton Anomalies Research Laboratory (PEAR). The PEAR work found highly significant correlations between the mean output of RNGs and the directed intention of subjects. The study attained a 4-sigma significance relative to the null hypothesis. The correlations also varied significantly from subject to subject, but were absent in control conditions. A replication of the PEAR study in collaboration with two other laboratories did not find significance of the primary correlations, but again found that variability of subject performance significantly exceeded null expectation. This category of research has been subjected to meta-analyses (Bösch et al., 2006; Ehm, 2005; Radin and Nelson, 1989 & 2002) assessing the entire corpus of RNG research dating from the 1960s to the present. These authors disagree in their willingness to accept psi as an explanation of the RNG experiments, but they concur that a small, unexplained, and statistically robust average effect is evident in the data, and that this effect may be modulated by a number of psychological variables.

The Global Consciousness Project emerged from a re-assessment of the RNG experiments (Nelson et al., 2002; Nelson and Bancel, 2006; Bancel and Nelson, 2008). The Project proposes that the deviations measured in goal-oriented, subject-intending RNG studies can be viewed as instances of correlations which obtain when coherent mental states become entangled with the environment. The proposal implies that the effect should be observable in situations involving many people and over extended distances. The GCP expands the canonical RNG experiment to its most general realization. The individual subject is replaced by large human populations, the single RNG by a synchronous global network, and focused intention is translated into designated periods of collective attention in the population.

This proposal can be summarized in the following hypothesis:

Periods of collective emotional or attentional behavior in widely distributed populations will correlate with deviations from expectation in a global network of RNGs.

The GCP thus incorporates two novel approaches to psi research. First is a theoretical stance which holds that there is a class of anomalous phenomena which is measurable independent of individual cognition or intention. This is a position which contrasts strongly with traditional thinking in parapsychology. Second, the Project has developed a synchronized, Internet-based global RNG network as a new instrument for testing these anomalous interactions with the environment. This follows closely the tradition of modern science in which research possibilities are extended by adapting technology to new instrumentation.

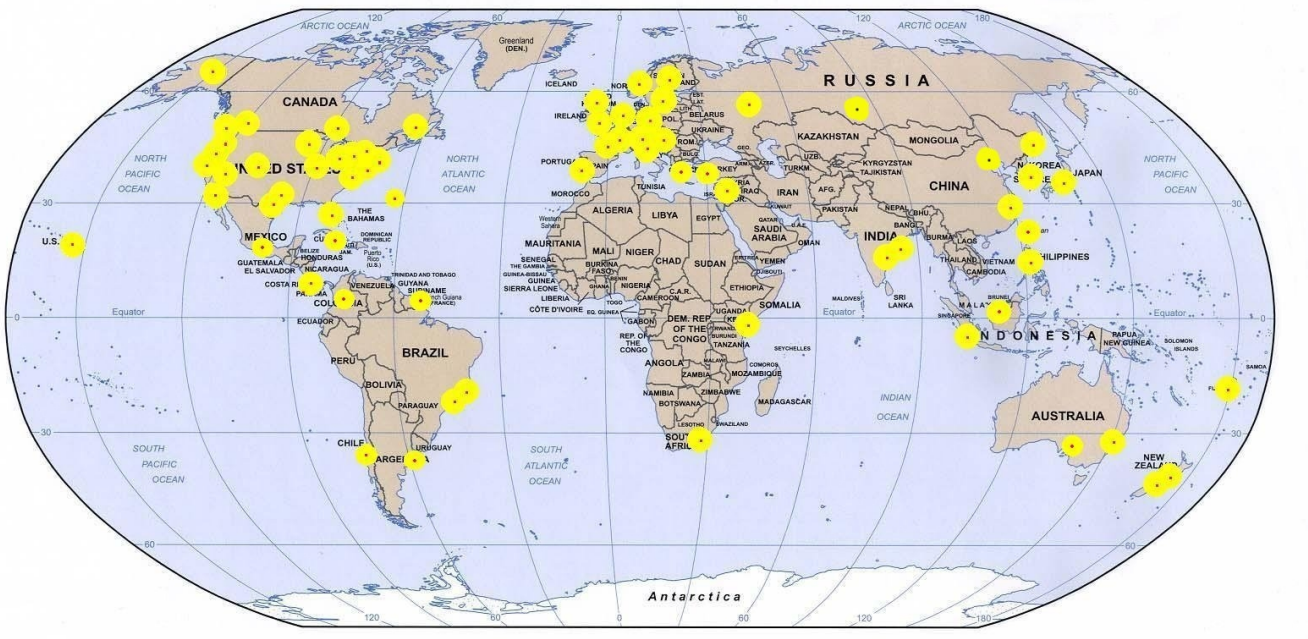

Figure 1. The current deployment of the GCP network. Node sites are indicated by the dots. Note the high concentration of nodes in Europe and North America.

The GCP adopts a three-phase approach to testing the hypothesis. 1) A proof of principle; 2) An analysis of data structure; and 3) Experimental refinement and re-testing. The proof of principle, which is purposely cast in broad terms, serves two purposes: to test whether broadly defined "global events" do indeed identify times of anomalous RNG deviation, and thereby to generate a data set that is suitable for the phase 2 analysis. Phase 2 informs how the network design and the testing procedure can be improved to increase measurement sensitivity. Implementation of these improvements constitutes phase 3. After a decade of operation, the project is preparing to close phases 1 and 2, and begin phase 3. The three phases are described briefly below.

Phase 1

Testing the hypothesis requires the designation of two elements: 1) an experimental period of mental activity – termed an "event", and 2) a specific measure of deviation for the corresponding data from the RNG network. At the outset, we adopt an approach which avoids over-determining the experimental variables, as is suitable for the beginning stages of a research endeavor. Emotional or attentional engagement on a global scale is taken as the guiding criterion for event designation. It is obvious that mental activity, both collective and individual, is ubiquitous and ongoing in the world. Nevertheless, a qualitative distinction can be made for events which simultaneously focus the attention of many people separated by regional or global distances. Occasions such as New Year's Eve celebrations or the news report of a major terrorist attack will define global events in this sense, representing identifiably singular instances of synchronous, communal mental activity. The criterion is inclusive in the sense that events with various types of population engagement may be studied in an effort to learn which factors contribute to the hypothesized effect.

The deviation statistics we employ measure correlations of RNGs in the network. As with the event designation, the criterion for the correlation statistic is inclusive; freedom in the choice of the statistic is allowed based on prior experience or the event type. The statistic is chosen, of course, prior to examination of the data.

The details of phase 1 can be summarized as follows. Data from a global network of RNGs are acquired continuously into a closed archive. An event of global significance is identified by the project. A time period for the event is determined and a correlation statistic defined. The event is designated a *formal event* by entering this information into a hypothesis and prediction registry. After the event is registered the data are unpacked from the archive and the test statistic is calculated, converted to an equivalent normal z-score and added to a table of all formal event results.

Over 250 replications of this protocol have been implemented since the project's inception in 1998. To date, the cumulative of event z-scores stands at 5 standard deviations against the null hypothesis (p-value ~ 3×10^{-7}), confirming the proof of principle to high significance. The significance of the phase 1 statistic has been verified by extensive re-sampling analyses for all events on the full database, as well as by simulations using pseudo-random data-sets. In each case, at least 100,000 iterations are used to verify the statistics.

It is important to note that the designated events, which typically have durations of several hours, comprise less than 1.6% of the entire database. While the cumulative event result is highly significant, the database as a whole conforms to expectation, as confirmed by extensive testing and verification.

Phase 2

The GCP hypothesis implicitly assumes that the measured correlations will exhibit geographical and temporal structure. In particular, this suggests a dependence of correlation strength with distance. A

temporal dependence is implied by the assumption that structure in the data will correspond to the timing of event periods. Finally, we expect that the effect should extend to all obvious correlation measures (in the language of physics, available correlation degrees of freedom should not be inexplicably hidden from the effect). The goal of phase 2 is to test for this correlation structure.

Our analysis shows that the phase 1 data deviations are driven by simple pair-correlations between the RNGs. This analytical result confirms the conjecture that correlations *across* the global network correspond to mental coherence among global populations at the time of events and is an entirely new result in parapsychology research. The pair-correlations can be represented (here in simplified form) as $S1 \sim < RNG1*RNG2 >$, the average product of all RNG pairs in the network. The formulation in terms of pair-products, an experimental result from phase 1, immediately implies what form tests of data structure should take in phase 2.

First, the RNGs are designed to and demonstrably do produce normally distributed outputs. As a consequence of normal statistics, there is one additional obvious correlation channel with a component orthogonal to S1. We designate this orthogonal statistic as $S2 \sim < RNG1^2 * RNG2^2 >$. Since S1 and S2 have identical mathematical structure, we expect that distance and temporal structure should appear in a similar manner for each statistic.

Each pair-product in S1 or S2 has a distance parameter associated with the geographical separation of the two RNGs. This permits a regression analysis against distance for each statistic. The expectation is that the regression should yield a negative slope indicating a decrease of correlation strength with increasing distance. Lastly, a test for temporal structure (i. e., whether the data deviations really correspond to events) can be made by correlating the time-ordered statistics S1 and S2.

All of these structural aspects obtain for the event data, while the remaining 98% of the database conforms to null expectation. The results these of phase 2 analyses, expressed in standard deviations from the null expectation, are listed in the table below.

Structure	Sigma	P-value
S1	3.67	.0001
S2	2.45	.007
Distance[S1]	1.49	.07
Distance[S2]	2.48	.006
Correlation[S1 S2]	1.95	.02
Combined Results Phase 2	3.9	.00005
Combined Results Phases 1&2	5.35	$\sim 5 \times 10^{-8}$

Phase 2 also addresses how the psychological or emotive aspects of events can be taken into account to construct refined hypotheses. This is more challenging since examining event subsets results in a loss of statistical power. The formal events of phase 1 naturally divide into six categories: terror attacks, natural disasters, political/national events, global meditations/prayers, celebrations and media/spectator events. An ANOVA analysis for statistics S1 and S2 across the event categories finds an significant interaction with a P-value of 0.03

The phase 2 results can be summarized as follows. S1 is derived from the experimental result of phase 1. It has a significance of ~ 3.7 standard deviations from the null hypothesis and a mathematical form which implies 4 tests of additional structure. These tests are based on very simple notions of expected correlation structure. The tests yield independent confirmation of anomalous data structure at the 3.9 sigma level. The category analysis suggests that S1 and S2 respond differently to the emotive valence of events.

Phase 3

The analyses of phase 2 indicate that the statistical power is limited by the relative rarity of global events and size of the network. Conventional solutions would be to acquire more data or increase the network's node number and acquisition rate, but neither of these are tenable. A modest increase of statistical power by a factor of two would require roughly 40 years of operation with the current network. To obtain a similar result within a reasonable time frame of three years would necessitate augmenting the network by a factor of 50, which is not possible technically or logistically.

The problem can be posed differently by considering the distance dependence of the measured correlations. The distance effect confounds two possible theoretical approaches to global consciousness. If global consciousness is imagined as due to a "consciousness field" established by coherent mental activity, then the distance effect could arise from a field coherence length which depends on the intensity of an event. In this case the consciousness field is truly global and the distance effect would be uniform around the globe. An alternate possibility is that global consciousness is local and arises in the proximity of populations attending to an event. Because populations are not uniformly distributed around the earth, this would give rise to a distance effect similar to what is observed.

As an illustration, consider the measurement of ocean heights which vary with tidal effects and local barometric conditions. Tidal effects are truly global and for tidal heights, timing differences vary only with the distance between two measurements, irrespective of where the pair of measurements is made. Barometric height effects, such as occur near a hurricane, also vary with distance, but depend on the locality of the storm system as well.

These two possibilities have different consequences for network design and deployment. A truly global effect implies that global consciousness is not localized at terrestrial distances and measurements are optimized by a homogeneously deployed network. Network sensitivity is linear in the node density, that is, in the square root of the number of RNGs. Network sensitivity for a "local" model depends on proximity to populations. It also suggests that global consciousness due to collective human activity will have a fractal structure, as do weather patterns and most other self-organizing natural phenomena.

The goal of phase 3 is to adapt the network to distinguish between these two possibilities by increasing the network's sensitivity to the distance effect. As shown in Figure 2, the phase 2 analysis finds a diffuse distance effect with a decay length of roughly 6000 Km. A better understanding requires information at both the shortest and longest distance scales of the network. However, as shown in Figure 3, these are regions where the network sensitivity is weak. The phase 3 proposal is thus to deploy RNGs to increase network sensitivity in these regimes. The deployment will include a thorough updating of the 10-year-old network software and archive structure. The data acquisition rate will be increased by a factor of four and data will be structured in parallel databases. This will allow future phase 2-type analyses to be formulated directly as hypotheses against concomitant, sequestered data.

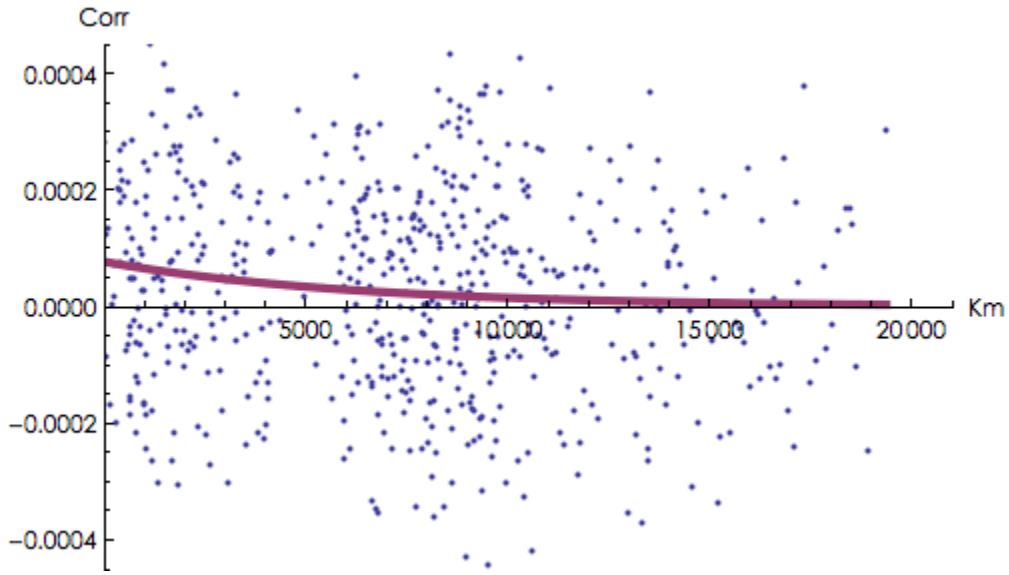

Figure 2. Distance dependence of the correlation data. The plot shows an exponential fit of the correlation strength versus RNG-RNG distance. The fitted exponential decay parameter of roughly 6000 Km provides an estimate of the range of the correlations. Points represent the mean correlation strength of S1 and S2 versus RNG-RNG separation, binned at 35 km intervals, for the 18 billion correlation pair-products of the event data. The heterogeneity of the data in the horizontal direction reflects the geographical distribution of the RNG network. The large, homogeneous vertical dispersion is typical of the weak effect sizes of RNG experiments.

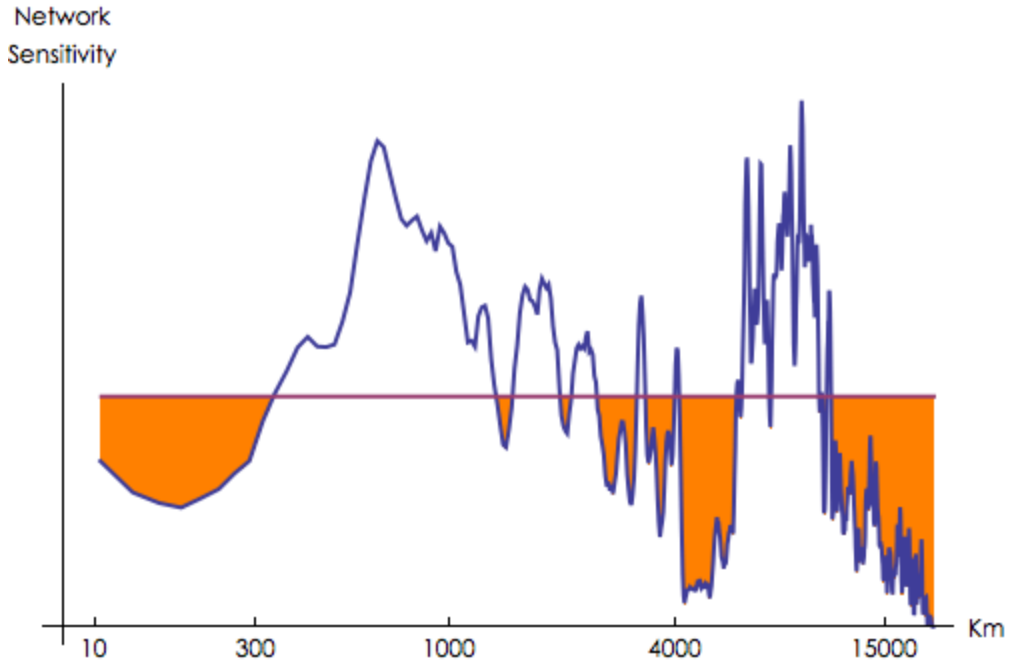

Figure 3. The network sensitivity as a function of RNG-RNG separation. The horizontal scale is logarithmic and the vertical is in arbitrary units. Shading shows regions where the sensitivity is weakest.

Objectives

There are four objectives to this proposal.

1. Increase the network sensitivity to correlations at the smallest and largest distances by deploying additional RNGs.
2. Add support for Universal Serial Bus (USB) RNGs to the data acquisition software.
3. Increase the RNG data acquisition rates by a factor of four.
4. Modify the data archive structure to pack the increased data streams into four parallel databases.

Methodology

Network Sensitivity

30 additional RNGs will be added to the network. Monte Carlo simulations will be used to determine optimal locations so that the network sensitivity to RNG-RNG separations in the 10-300 Km and 14,000-20,000 ranges will be maximized.

USB Support

The current network uses a serial port to connect the RNG to local host computers. Serial ports are no longer standard hardware on PCs, and this severely restricts the availability of potential node sites. It is thus crucial for the network to have USB capability in order to accomplish the targeted deployments envisioned. USB will also provide a more stable environment for the RNGs which draw their power directly from the computer interface.

Data Acquisition Rate

The network was originally commissioned before high-speed Internet connections were standard. The custom acquisition software developed by the Project limited the local host acquisition rates to achieve data streams to the central server in Princeton, N.J. that were compatible with Internet limitations. Consequently, a substantial latency remains untapped. A relatively simple modification of the local host software is sufficient to increase data rates by a factor of four.

Archive Structure

The increased acquisition rates will be complemented by a modification of the server archiving software. The increased data stream will be directed into separate, parallel databases. The databases will mirror current structure to allow a smooth integration with the existing ten-year database. One or more of the parallel databases will be formally sequestered. This will allow for data-splitting analyses in which hypotheses from exploratory analyses can be tested directly.

We have assembled an expert team to execute the proposal. Dr. Roger Nelson, the creator of the GCP, has directed the Project since it's inception and will oversee the RNG deployment. Greg Nelson and Paul Bethke will collaborate on software modifications. Greg Nelson designed and wrote the original data acquisition and archive software. Paul Bethke ported the original Unix software to Windows. Dr. Peter Bancel has been Project analyst since 2003 and is responsible for the phase 2 and phase 3 analyses. He will design the geographical deployment and assist Dr. Nelson in all aspects of the proposal.

Bibliography

Bancel, P. and Nelson, R. (2008): The GCP Event Experiment: Design, Analytical Methods, Results, *Journal of Scientific Exploration,* in Press.

Bösch, H., Steinkamp, F., & Boller, E. (2006): Examining psychokinesis: The interaction of human intention with random number generators. A meta-analysis. *Psychological Bulletin, 132,* 497-523

Ehm, W. (2005): Meta-Analysis of Mind-Matter Experiments: A Statistical Modeling Perspective, *Mind and Matter* **3**, 85-132.

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Radin, D. I., & Nelson, R. D. (1989): Evidence for consciousness-related anomalies in random physical systems. *Foundations of Physics,* **19**, 1499-1514.

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Radin, D. I. (2004): Electrodermal presentiments of future emotions. *J. Scientific Exploration*, **18**, 253-274.

Research Centre Where the Project Will be Conducted

Name: Global Consciousness Project

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City: Princeton, New Jersey

Country: USA

Telephone: 1 609 924 4875

Fax: 1 609 924 4875

E-mail: rdnelson@princeton.edu; URL: http://noosphere.princeton.edu

Purpose of Research Centre: Long term study, group and global consciousness

Director of Research Centre: Dr. Roger D. Nelson

International Affiliation of the Centre: The centre is inherently an international project, with collaborators in 30 countries around the world. Our fiscal affiliation is with the Institute of Noetic Sciences, Petaluma, CA, USA.

Schedule of Project

December 2008 – November 2010
Project Duration: 24 months

December 2008
Contact programmers and consultants.
Set design parameters for network upgrade.
Set design parameters for database.
January – May 2009
Software development
Monte Carlo simulations of network
June – December 2009
Test software and RNG integrity; RNGs are typically tested for several months before commissioning.
Contact new network hosts in targeted geographical areas
January-March 2010
Deploy and test network
April-June 2010
Upgrade nodes of existing network
July-September 2010
Test full network
October-November 2010
Analyze data on correlation distance effect

III. PROJECT BUDGET

Activities	
Salary (2 years, 75%): Dr. Bancel	€ 30.000
Consultants	
Linux programming	€ 2.000
Windows programming	€ 2.000
Database consultant	€ 2.500
Total	€ 6.500
Equipment	
30 USB RNGs @ 250 €	€ 7.500
Mathematica License renewal	€ 550
Total	€ 8.050
Other Expenses	
Travel expenses	€ 1.000
Office supplies	€ 500
Total	€ 1.500
Budget Summary	
Salaries	€ 30.000
Equipment	€ 8.050
Consulting	€ 6.500
Travel & supplies	€ 1.500
Project Total	€ 46.050

IV. ATTACHMENTS

Attachment 1: Opinion of the Institution where the project will be conducted

I am the director of the Institution where the project will be conducted, as well as one of the principal investigators in the project. I hope the following meets the requirement for Attachment 1.

We believe that the Global Consciousness Project database presents an unusually rich opportunity to address questions that have arisen in parapsychological research.

It is a large database of "replications" of a few basic experiments, and is in addition, a hitherto unexplored type of data, namely, a continuous series over months and years of parallel sequences of random numbers. The hypothesis that there might be an effect of group or global consciousness has been tested in promising preliminary work by several researchers. The GCP is a much bigger and more consistent experimental paradigm that should allow several difficult issues in parapsychology to be addressed fruitfully. In addition, the GCP data allow, in principle, an assessment of the fundamental relation of random data to a wide variety of potential influences – from physical, biological, and social sources in addition to the anomalous sources posited in the main hypotheses.

We are confident in the scientific qualifications and the philosophical approach of the principal investigators, and we expect the project to be completed with professional care and rigor.

Roger D. Nelson
Director, GCP

Attachment 2: External experts' reports concerning the project (optional)

The Global Consciousness Project is well known to the parapsychology research community, including several people who are known to the Bial Foundation. If recommendations are needed, please contact, for example, Dr. Richard Broughton, Prof. Deborah Delanoy, Dr. Dean Radin, Dr. Ed May, Dr. Caroline Watt or other leaders in the parapsychology research community. The late Prof. Robert Morris was supportive of the Global Consciousness Project, and encouraged submission of a proposal to the Bial Foundation.

Attachment 3: Proof of Academic Qualifications of the project leader

Please see my Curriculum Vitae in the body of this funding proposal. My qualifications include teaching and research at the university level for 32 years, most recently (1980-2002) at Princeton University, Princeton, NJ, USA. I was the coordinator of research at the Princeton Engineering Anomalies Research laboratory (PEAR), and the principal architect of our experimental design and analysis strategies. My publication resume comprises more than 100 articles, reviews, book chapters, and technical reports dealing with professional research in

anomalies associated with human consciousness.

Attachment 4: Declaration signed by the project leader mentioning that the Investigation Team has insufficient economic funds to allow the accomplishment of the research without support

I declare that the Global Consciousness Project and the Analysis Investigation Team has insufficient funds to accomplish the proposed research and analysis without support.

Roger D.Nelson

Attachment 5:

DECLARATION

I, the Project Applicant for a bursary of BIAL Foundation for financing the Research Project "**Monitoring Global Consciousness: Measurement Enhancement and Parameter Refinement**", declare that:

I have been fully informed and accept the terms of the Regulation of Bursaries for Scientific Research of the BIAL Foundation, approved by the Fundação para a Ciência e a Tecnologia in pursuance of Law nº 40/2004, of 18th August.

Date August 30 2008.....

Signed

Roger D. Nelson.....