Mind-Matter Interaction at a Distance of 190 km: Effects on a Random Event Generator Using a Cutoff Method

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ABSTRACT

We used a new method to test whether subjects could influence the activity of a distant random event generator (REG). In a pilot study, participants selected for their strong motivation and capacity to control their mental activity were requested to alter the functioning of a REG, located in a laboratory approximately 190 km so as to achieve a deviation of ± 1.65 standard scores from the expected mean, during sessions lasting approximately 90 seconds. The predefined cutoff was achieved in 78% of 50 experimental sessions compared to 48% of the control sessions. This study was replicated with a pre-registered confirmatory study involving thirty-four participants selected according the same criteria as in the pilot study. Each participant contributed three sessions completed in three different days giving a total of 102 sessions. The same number of control sessions was carried out. The percentage of the experimental sessions which achieved the predefined cutoff was 82.3% out of 102, compared to 13.7% for the control ones. We discuss the opportunities for exploiting this method as a mental telecommunication device.

Key Words: mind-matter; random event generator; interaction at distance; telecommunication

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Introduction

A strict reductionist interpretation of the human mind, postulates an identity between its phenomenological and its neural representation (Smart, 2007), i.e. the human brain has only local properties and mental activity is subject to the same laws of functioning and can interact with biological variables only via direct connections by the senses.

However if we consider the human mind to be different from its neural correlates, it becomes sensible to investigate whether certain mental phenomena violate the boundaries of brain functioning. For example, we can seek to observe interaction at distance with mental, biological and physical variables. This interpretation of the human mind is not new. Its roots can be found in the sacred texts of the Advaita Vedānta philosophical tradition, according to which the physical universe is seen as an undivided whole in which everything is interconnected and the plurality of empirical phenomena is the expression of a unifying and underlying principle of existence and consciousness (mind) called *Brahman* (Satprakashananda, 2005). More recent philosophical theories, such as the non-physical realism (Staune, 2013) and the dual-aspect

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monism (Atmanspacher, 2012) have also postulated that human mind is not bounded by space and time constraints. Non-physical realism refers to the assumption that reality cannot be explained exclusively by observable causes in space-time and that consciousness and matter stem from a unique substance that "antedates the scission between the subject and the object". Dual-aspect monism (Atmanspacher, 2012) is a similar theoretical approach based on a detailed reconstruction of the Pauli-Jung conjecture which yields a psychophysically neutral, unitary reality beyond the distinction between the mental and the material.

If we assume the human mind can express nonlocal (that is, no space and time constraints) properties, it becomes possible, for example, to study a puzzling phenomenon whereby mind appears to influence physical objects. In quantum physics there is the well-known quantum measurement problem (QMP). Briefly, it seems that quantum objects, e.g. photons, behave differently when observed (measured) than when unobserved (not measured). This can easily be demonstrated in a double-slit optical system using a detector to determine the path that photons take through the two slits. When "which-path" information is obtained, photons behave in a particle-like fashion; otherwise they behave in a wave-like fashion. This phenomenon poses a serious problem for the "realism", the philosophical idea that things are independent of observation (Gröblacher *et al.,* 2007). Although the interpretation of this phenomenon is hotly debated within and outside the physics community (Norsen and Nelson, 2013), empirical data continue to accumulate. For example, Radin et al. (2012, 2013), repeatedly demonstrated that human observers can alter the spectral magnitude and phase associated with the double-slit component of the interference pattern, simply forming a mental image or concentrating on the apparatus so to cause the laser beam to go through one slit rather than both. The typical method consisted of sessions of 40 counterbalanced attention-towards and attention-away epochs lasting from 10 to 30 seconds each. The best effects were obtained using participants with meditation experience. Furthermore, these sane effects were observed when participants were remote from the apparatus and performed the experiment via the Internet.

Another line of research dating back to early 1960s, concerns mental influence on random event generators (REGs). The accumulated evidence has been synthesized in different meta-analyses, (e.g. Radin and Nelson, 1989; Jahn *et al.,* 1997; Bösch, Steinkamp and Boller, 2006). In this line of research the typical method requires the participants working individually or in pairs, to alter the random output of zeroes or ones produced by electronic devices by more than the deviation obtained in the control (no mental influence) condition. Participants are usually required to shift a random series of 200 binary digits generated at a rate of 1000 per second. Participants sit in front of the device but not in physical contact with it. They have to accumulate the prescribed number of same size blocks of data under three different interleaved states of intention: to achieve a higher number of bit counts than the theoretical mean (HI); to achieve a lower number of bit counts than the theoretical mean (LO) and not to influence the output, i.e., to establish a baseline (BL). Data from a number of experimental sessions are combined to give data series of a predefined specified length, ranging from 1000 to 5000 trials per intention state.

In their meta-analyses Bösch, Steinkamp and Boller (2006), reported that there was considerable heterogeneity in the methods used and, as a consequence, the estimated effect size varied considerably although it was always of very small magnitude (typical effect size π of approximately 0.500035).

Some consider the reality of mind-matter interaction to be an established fact and therefore believe it is time to investigate the conditions that moderate this effect and to devise practical applications, others, still do not consider that there is sufficient scientific for the phenomenon.

In order to provide evidence for the existence of mind-matter interaction, we devised a short, simple and practical method with some advantages with respect to the previous ones used to investigate the remote mental interaction with an electronic REG. First, instead of asking the participants to achieve a higher or lower number of bit counts with respect to the theoretical mean, we simply asked them to get a modification of the theoretical mean independently from its type. Secondly, to reduce the mental efforts, we shortened the time of each session from a maximum of three minutes in the pilot study to one minute in the confirmatory study. Thirdly and more important, we defined a predefined measure of deviation from the theoretical mean as a cutoff to establish when the goal of the session was achieved. In both the pilot and the confirmatory experiment, we chose a deviation from the theoretical mean corresponding to a normalized *z* score ± 1.65 corresponding to the 0.90 cumulative function as the cutoff.

Pilot Study

Method

Participants

We recruited seven participants aged from 24 to 67 years who were very interested in the goal of the experiment and had experience in mental control. Hence, the critical selection criteria were strong motivation and the capacity to control one's mental activity.

Apparatus and Procedure

We used a Psyleron™ REG-1, connected to a dedicated 64 bit PC running Windows7, located in a Faraday shielded laboratory in the Department of General Psychology of Padova University, Italy that could be activated at distance via an Internet connection. Technical details Psyleron™ REG-1 are given in the Appendix.

Participants were located in the EvanLab, approximately 190 km far from the REG. They acted in small groups ranging in size from three to seven individuals depending on their availability. Participants completed fifty experimental sessions in six different days, depending from participants' level of mental fatigue and concentration. Sessions lasted from 60 to 200 seconds depending from the participants' choice, with setting of "Sample Size 10 bit" and "2 Per Second" on the Psyleron™ REG-1. Participants were asked to influence the REG output to achieve the cutoff level, fixed at ± 1.65 *z* scores from the theoretical mean, which correspond to 0.90 cumulative function, over the duration of a given the session.

When the participants met at the laboratory for a session, the computer connected via Internet with the REG was activated by a research assistant. Recording was started when the group was ready to influence the REG mentally.

Particular care was devoted to the mental strategy to adopt to influence the REG output. Following the Jahn et al. (1997) and Radin et al. (2012; 2013) findings, participants selected the strategy of "becoming one with the apparatus and imagining that one remains inside it with positive emotions". During the session, participants cannot see the REG output. They saw their results offline.

We compared the number of experimental and control sessions of the same length and bit rate in which the cutoff was achieved. The control sessions were recorded by a single operator inside the laboratory where the REG was located.

Figure 1a. Example of a session in which the cutoff of ± 1.65 z-scores from the expected mean was achieved, see Max Z = 2.3 value. The associated number (#153) indicates the number of the bit string in which this result was obtained.

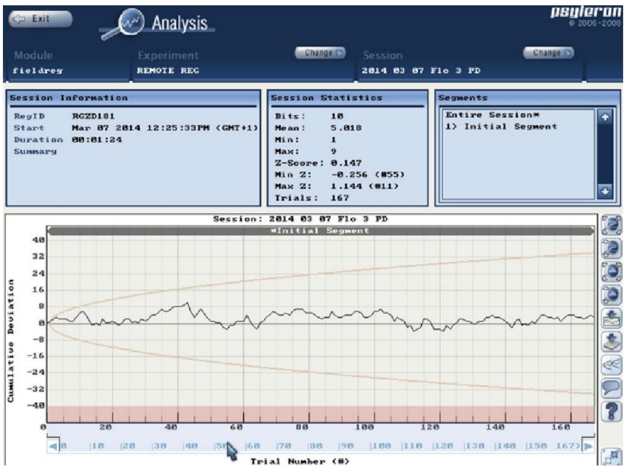

Figure 1b. Example of a typical session expected with no mental interference.

Results

An example of an experimental session in which the cutoff was met is presented in Figure 1a, whereas an example of a session representing the expected output is presented in Figure 1b.

Descriptive and inferential statistics for the number and percentages of sessions when the cutoff was met in the experimental and control conditions are reported in Table 1. The average duration of the sessions was 87 seconds, range 60-196, whereas the average period when the cutoff was achieved was approximately 35 seconds, range 5-95.

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Table 1. Descriptive and inferential statistics for the number and percentages of sessions when the cutoff was met in the experimental and control sessions

Sessions	N (% out 50)	Effect size *d* [95% CIs]	Bayes Factor $_{H1/H0}$*
Mental interaction	39 (78)	0.44 [0.15, 0.73]	52.4
Control	24 (48)		

*Bayes Factor $_{H1/H0}$ quantify the support that the data provide for the alternative hypothesis (H_1=mental influence) with respect to the null hypothesis (H_0=no mental influence). It was calculated using the online applet available here: http://glimmer.rstudio.com/rdmorey/bfProportions. Unit-information priors' parameters to achieve a half-normal distribution were planned as follow: $\mu\mu$=0, $\sigma\mu$=0.75, μd=0, and σd=0.5; one-sided.

In light of these results we planned and pre-registered a confirmatory experiment, which was intended to replicate the findings with a new pool of participants. The only differences between the pilot experiment and the confirmatory experiment were: a reduction of session length from 90 to 60 seconds to facilitate mental concentration; a change in the emission rate of the random sequence of bits from 20 to 200 per second to bring the rate in line with that used in other previous experiments and the use participants acting individually rather than in groups, to investigate remote individual mind-matter interaction.

Confirmatory Experiment

Method

Study preregistration

Following the suggestions of Wagenmakers et al. (2012) and of the *Open Science Collaboration* (2012), the experiment was registered on the site http://www.openscienceframework.org and the http://www.koestler-parapsychology.psy.ed.ac.uk/TrialRegistry.html before data collection.

Participants

We recruited thirty-four participants who each contributed to three sessions completed in three days giving a total of 102 sessions. The selection criteria were a strong interest for the subject of the experiment and experience in mental control obtained by meditation or other similar practices. The final sample included 20 females and 14 males. The mean reported number of years of practice of mental control was 7.4; range: 1-18. The age of participants ranged from 20 to 68 years.

Apparatus and Procedure

The same REG as in the pilot study was used. Participants, acted individually from their homes which were located between 4 and 1512 km from the REG. Sessions lasted 60 seconds with the Psyleron™ REG-1 options set to "sample size 200 bits" at a rate of " 1 second" . The participant's task was to influence the REG output to achieve the cutoff level, fixed at ± 1.65 *z* scores from the theoretical mean, which correspond to 0.90 cumulative functions within the time window of the session. An image of the desired output (see Figure 1a for an example) was delivered to each participant to be used as a guide for visualization.

Participants agreed the dates and times of sessions with the research assistant who was responsible for activating the computer connected with the REG via an Internet connection at the planned time. The research assistant activated the REG to record each experimental session. Participant were free to prepare for the session (e.g. with meditation) beforehand. The result was communicated to the participant at the end of the session if required. Only eight out thirty-four participants requested feedbacks on all their sessions.

The research assistant recorded a matched control session for each experimental session. Control sessions were recorded on the same day, but at a different time from the experimental session so as to avoid unwanted mental influence.

As in the pilot study, participants were invited to adopt the strategy of "becoming one with the apparatus and imagining that one remains inside it with positive emotions", but they were free to adopt whatever technique they considered effective. We recorded a total of 102 experimental and 102 control sessions overall. All experimental and control sessions outputs are available on http://figshare.com/articles/REG_Confirmatory/1066180 for independent analyses.

Results

Descriptive and the inferential statistics for the number and percentages of experimental and control sessions when the cutoff was met, are reported in Table 2. The average duration of the sessions was 62 seconds, range 60-71, whereas the average time period during which the cutoff was achieved, was approximately 34 seconds, range 10-66.

Table 2. Descriptive and the inferential statistics for the number and percentages of experimental and control sessions when the cutoff was met.

Condition	N (% out 102)	Effect size *d* [95% CIs]	Bayes Factor $_{H1/H0*}$
Mental interaction	84 (82.3)	0.97 [0.73, 1.21]	$7.3x10^{11}$
Control	14 (13.7)		

*=using the same priors of the pilot study

Comparisons with the Pilot Study

The number of experimental sessions that achieved the cutoff was very similar to that in the pilot study, 82.3% vs 78.0%. However, the percentage of control sessions that achieved the cutoff was 48% in the pilot study compared with 13.7% in this study. This difference is not easy to explain. At present, the only plausible explanation is that in the pilot study, all control sessions were recorded by an operator located in the same laboratory as the REG, whereas in this study, the operator was in his home operating remotely. Although the operator in the pilot study did not try to influence the REG, it is possible that the proximity of the operator responsible for the recordings could have enhanced the number of control sessions meeting the cutoff.

Discussion

The efficiency of mental interaction at distance with a REG using the new method seems quite satisfactory. An efficiency of approximately 80%, although not perfect, seems sufficient to warrant devising ways of exploiting the effect in mental telecommunication devices. The advantages of this new method over previous methods are its very short duration and the use of a cutoff instead of a mean deviation. Using this method we observed remote mind-matter interactions involving groups and individual participants. It is important to note the characteristics of our participants, determined by our selection criteria. We believe that in order to achieve these effects, participants must be very motivated and above all, they must have sufficient capacity to control their mental activity and to concentrate during the interaction at distance.

Theoretical Development

The reproducibility of results with our user-friendly method can be exploited to investigate possible biophysical correlates underlying remote "mind-electron interaction". In our opinion, the most interesting approach currently in use is that pursued by the Persinger group which has been investigating correlations between the intentional emission of human biophotons and REG modifications (e.g. Caswell, Dotta and Persinger, 2014). Their core hypothesis that focused human intention can alter the REG electronic device by exploiting classical (bio)photons-electrons interactions, investigating directed mental interactions within shielded apparatuses in order to avoid any photons interference or absorption, seems a very promising approach.

Future practical application of the method

Remote influence on an REG over a very short time period can easily be transformed into a binary acoustic or visual signal when the cutoff is reached and associated with a message. For example, one signal could be associated with the message "call me", two signals with the message "be alert" and so on. Furthermore the possibility to have an REG installed in a smartphone, see the project Collective Consciousness App (http://www.consciousness-app.com), make this kind of application a possibility for the near future.

APPENDIX

Psyleron™ REG-1 technical details

Overview

The Psyleron REG-1 is based on the MicroREG devices designed and used at the Princeton
Engineering Anomalies Research lab, with a few technical enhancements to increase the quality of its random output and allow it to be interfaced with USB-based computers.
The key goal of the REG-1 is to produce bits which are derived from fundamental physical randomness but in such a way as to minimize the susceptibility of its output to known physical processes. This involves shielding, sampling output from multiple analog noise sources, and applying post-processing to minimize or fully eliminate the effect of physical processes on the first-order statistics most relevant to experimentation with the device. Under normal conditions, the Psyleron REG-1 devices should pass all known statistical tests. In addition, no Psyleron design is ever manufactured until some subset of experienced operators and beta users feel as though they are able to produce effects using the device. This criterion is often subjective, but backed by user-produced data. Source: The REG-1 is a PC-Powered electronic device. At its source, the random output of the REG-1 is generated by quantum tunneling in a field effect transistor, which produces unpredictably varying voltage levels that are processed and converted to a digital stream. Most modern REG-1 devices, including all variants of the professional edition include two of such random sources, which are compared against one another using an XOR operation in an attempt to further reduce the impact of physical artifacts.

Shielding

Shielding for the Professional Psyleron REG-1 device involves at least two
components; an outer (aluminum) shield that encloses the entire circuit, as well as an inner permalloy mu-metal shield that isolates the sensitive analog portions of the circuit. The inner shield attenuates both electrical and magnetic effects from inside and outside of the device.

Processing

To further ensure the randomness of the output and prevent fluctuations due to environmental factors, the digital output of the Psyleron REG-1 is bitwise-XORed with a varying pseudo-random mask. This has the effect of ensuring statistically balanced REG output, even in the case of physical biases in the noise source.

Sensitivities

The processed output of the REG device is not known to be sensitive to any
physical processes, due to the above precautions. In extreme theoretical cases where the device is somehow biased by physical factors, the output would most likely resemble an unbiased but defective pseudo-random source that would fail calibration tests. New versions of the REG1 device include a red LED indicator to rule out even this extremely improbable possibility.

Statistical Tests

Before being shipped to customers, the Psyleron REG-1 device must pass a variety of stringent calibration tests. Each individual device is subject to testing on at least 5 sets of 1 million-200 bit trials; (equivalently, 1 billion bits), generated on separate occasions. Devices pass, fail, or are subject to additional testing based on the outcome of the studies. Any devices that fail or are subject to additional testing do not qualify to become "Professional Edition" REG-1 devices.

REG-1 devices in each manufactured pool are also randomly selected to be screened using external statistical tests, such as the Diehard test. To date, all tested Psyleron REG-1 professional edition devices have passed this battery of tests based on generally accepted criteria. As of March 2009, all Psyleron REG-1 Professional edition devices are also subject to this battery of tests.

References

Atmanspacher H. Dual-aspect monism à la Pauli and Jung. Journal of Consciousness Studies 2012; 19: 96-120.

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

Caswell JM Dotta BT and Persinger MA. Cerebral Biophoton Emission as a Potential Factor in Non-Local Human-Machine Interaction. NeuroQuantology 2014; 12:1-11.

Gröblacher S, Paterek T, Kaltenbaek R, Brukner Č, Żukowski M, Aspelmeyer M and Zeilinger A. An experimental test of non-local realism. Nature 2007; 446: 871-875.

Jahn RG, Dunne BJ, Nelson RG, Dobyns YH and Bradish GJ. Correlations of random binary sequences with pre-stated operator intention: A review of a 12-year program. Journal of Scientific Exploration 1997; 11: 345-367.

Norsen T and Nelson S. Yet another snapshot of foundational attitudes toward quantum mechanics. arXiv preprint 2013; arXiv:1306.4646.

Open Science Collaboration. An open, large-scale, collaborative effort to estimate the reproducibility of psychological science. Perspective Psychological Science 2012; 7: 657–660.

Radin D, Michel L, Johnston J and Delorme A. Psychophysical interactions with a double-slit interference pattern. Physics Essays 2013; 26: 553-566.

Radin D, Michel L, Galdamez K, Wendland P, Rickenbach R and Delorme A. Consciousness and the double-slit interference pattern: Six experiments. Physics Essays 2012; 25: 157-171. doi: 10.4006/0836-1398-25.2.157

Radin DI and Nelson RD. Evidence for consciousness-related anomalies in random physical systems. Foundations of Physics 1989; 19:1499-1514.

Satprakashananda S. Methods of knowledge according to Advaita Vedānta. Kolkata: Advaita Ashrama 2005.

Smart JJC. The mind/brain identity theory. http://stanford.library.usyd.edu.au/entries/mind-identity 2007.

Staune J. Towards non-physical realism. In A. Suarez, & P. Adams (Eds.), Is science compatible with free will? (pp. 209-224). New York: Springer 2013.

Wagenmakers EJ, Wetzels R, Borsboom D et al. An agenda for purely confirmatory research. Perspective Psychological Science 2012; 7: 632–638.