Summary on Research on Mind Matter Interaction by Princeton PEAR Project

(PEAR = Princeton Engineering Anomalies Research)

by Robert Grosch

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Links: Main Project Page: http://www.princeton.edu/~pear/
Video on Webpage: http://player.vimeo.com/video/4359545?title=0&byline=0&portrait=0
Summary Video on Youtube (German transl.): http://www.youtube.com/watch?v=LV1ANpVRbLo
Spin-off: http://www.psyleron.com/
Critical views: http://en.wikipedia.org/wiki/Princeton_Engineering_Anomalies_Research_Lab
Reseach Publications: http://www.princeton.edu/~pear/publications.html

Summary:

The PEAR project investigated human mind / matter interactions [1,2]. It was found that the intention of an operator observing a random process could influence the probability distribution of that random process. The random processes studied involve a number of different physical setups [2], e.g.:

- a large random mechanical cascade of balls through a peg matrix (Galton board);
- a linear pendulum, whose damping rate or symmetry of swing are the targets of operator initiative;
- a small upward jetting water fountain, whose transition from a laminar stream to turbulent burbling, or whose degree of droplet scatter provide the measurables addressed;
- an electronic coin flipping device called Random Event Generator (REG).

All setups were gauged (electronic devices were also shielded) to obtain the reference distribution within the normal statistical limits in case no observer was present [1]. Then, an operator was added to the experiment. The operators were usually just normal, average people. Their task was to sit next to the experiment and either to intend to shift the frequency distribution (of the random process that was evolving in front of them) to some side or to intend that it would remain as unaffected as possible. For example, the operator would observe the balls running through the Galton board, and the stacks of balls underneath would be building up, evolving into a shape close to the Gaussian distribution. During that process he or she would then intend the distribution to shift to the left or right side. The experiment showed that the observed frequency distributions obtained under such circumstances in fact deviated so much from the Gaussian, that it was statistically very unlikely that the outcome was pure chance. A similar result was found in every experiment. Particularly, with the electronic coin flippers a large number of experimental data can be generated in a short time, supporting the fact that these are real phenomena with strong statistical evidence [1,2,3]. Cumulatively, the overall probability that the observed phenomena are only due to pure chance (likelihood by chance) are as low as one in a trillion [1]. It should be noted, however, that for some operators the effect is found to be more pronounced, than for others [2]. Interestingly, the data also showed that female operators usually produced more significant results, while for male operators typically the results more often corresponded to their prerecorded intention [1,2]. Also, if male and female operators with a common background were present, that effect was typically most pronounced [1,2]. More recent results also indicate that meditators perform on average better than operators who do not meditate [1].

However, the results were not accepted by the scientific community [2,5]. In [5] it is argued that the baseline of the electronic REGs was not valid. If large data sets were generated with REGs that are affected by an unknown yet small bias, then even very small biases would inevitably compound to statistically significant effects in very large data sets. In [6] it is argued that an analysis of the experimental data shows that the mean frequency produced by the operators is as low as 51 % or less compared to the chance expectation of 50 % (the exact data analyzed and the statistical methods used are not given in [6]). Hence, the effect observed is only insignificantly small. Also, the data revealed that one operator, supposedly staff from PEAR, was accountable for 15 % of all experiments and produced 50 % of the overall effect. If this data was excluded from the dataset the results would classify as marginally significant at best. It is also criticized in [6] that a comparative study performed in Germany was unable to reproduce the results. In [6] it is further stated that PEAR did not take into account two points of criticism: PEAR did not carry out the experiments using two REGs. One REG should have been used to determine the operator intention (High or Low) for a given experimental run, while the actual run should have then been carried out on the second REG. This would have avoided an operator bias. Also, the operators should have tried to influence a microbalance that can measure a millionth part of a gram instead of influencing a REG.
In [2] it is, however, stated that the study in Germany showed significant effects hidden in other variable correlations within the dataset and that the workings of consciousness were not always linear, but subtle, particularly because the subconscious mind was at least as important in these studies as the linear conscious mind. Also, [2] shows data, where one operator alone achieved results with a likelihood by chance for the Hi-Lo-separation is of the order of one in a million in 5000 trials. In [2] the authors also present data for the same operator resulting in a likelihood by chance for the Hi-Lo-separation of the order of one in 100 million after 125000 trial. The authors are also very open about the fact that one very “prolific” operator existed [2].

Personal viewpoint: The data presented in [2,3] looks convincing to me. I do not consider it a problem, that one operator was particularly successful in influencing the REG. I would rather say that a varying performance over operators is expected and in accordance with reports of meditators all over the world: progress in Samatha meditation leads to a more powerful mind.
Furthermore, empirical science can never make a statement about truth. It can only make statements that are not yet proven to be wrong. If there are conclusive results, be it only for a small number of operators, that show that there is a significant effect on REGs, then this must be accepted. I ordered a REG for my school to perform my own experiments. I am curious to see how my performance on the device will develop as I continue to meditate over the years.
Also, asking that an operator should be able to influence a microbalance measuring weights in the order of 10^{-9} kg is substantially different than what the PEAR study set out to do. A microbalance is not a random process. If there existed a balance, so subtle, that it could weigh individual electrons (with mass in the order of 10^{-30} kg or at least individual atoms with mass in the order of 10^{-27} kg), then this would be a fairer comparison. However, such a balance would not show one constant value at room temperature. It would fluctuate all the time, because of the fluctuating energy states of the atoms it consists of, or of those atoms being “weighed”. I imagine that the mind of the operator influences say the position of a million electrons in the semi-conductor material of an electronic REG, which is just enough to make one fluctuation of an internal signal in the device swing so far that the overall output of the device is pulled to a High value, while it would not have built up enough without the contribution of the electrons influenced by the operators mind. Instead the internal fluctuation would have leveled out again to become a Low signal on the device output. Then the mass (or energy

$E = m*c^2$) that needs to be influenced by the operators mind is still only in the order of only 10^{-24} kg. The stronger the mind gets, the more it will be able to influence enough electrons to pull also smaller internal disturbances – which occur randomly and with different amplitudes – to a High or Low signal.

References:

[1] Psyleron Inc: REG User Manual for versions: Reflector 1.63, FieldReg 1.63.

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[3] Jahn, R. G. (1982). The persistent paradox of psychic phenomena: An engineering perspective. Proceedings of the IEEE, 70, 136–170.

[4] Jahn, R. G., & Dunne, B. J. (1986). On the quantum mechanics of consciousness, with application to anomalous phenomena. Foundations of Physics, 16, 721–772.

[5] Pigliucci, M..: "Nonsense on Stilts: How to tell Science from Bunk". University of Chicago Press, 2010.

[6] Carroll, R. T. (2013). The Princeton Engineering Anomalies Research (PEAR). *The Skeptic's Dictionary* (online ed.).