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## **High performance REG array with simultaneous Read-Out - Exploration of a new REG design, involving self-selective amplification and EEG triggered read-out for PK studies**

### **Results:**

We constructed a true physical random event generator, the so-called T.REG, that uses triggers from various sources to elicit binary events sampled from electronic noise. The advantage of free triggers features most prominently in the idea of creating operational closure between the sampler and the triggering agent in an explicit trigger-feedback-loop. Three modes of triggers and arrangements are investigated: a fixed frequency clock, and two types of modulated voltage controlled oscillators (VCO), one internally driven by the output sequence, the other modulated by subject's one-channel EEG pattern. With sampling three random sources in parallel channels, the integrative capacity of the apparatus is explored.

Data has been collected from 20 human participants in all three triggering modes, trying to deviate the outcome of the REG under four experimental conditions. The subjects received acoustic feedback of their rate of success. In trials of 1501 records, events and transitions are counted in blocks of 200 bits and analyzed under the null hypothesis of randomness. Descriptive statistics are extracted as Z-values with respect to the theoretical mean and variance.

A significant shift in the mean value of the hit score could not be found. The variance measure, however, was increased to  $Z=2.587$  across all subjects in EEG-triggered trials with M-Switch, a device to deliberately invert the meaning of hits and misses. Surprisingly, it has been found that the significantly increased variance was generated by male subjects only ( $Z=2.937$ ), and in those periods when the M-Switch was not actively used (unpressed) ( $Z=2.899$ ), indicating a possible psychological factor. It is conjectured that subjects react to the past sequence of events.

### **Published work:**

- Braeunig M. & Faul T., High Performance REG Array with Simultaneous Read-Out - Exploration of a new REG design, involving self-selective amplification and EEG triggered read-out for PK studies; BIAL Summary Report, 2006
- Braeunig M. & Faul T., Patent DE102005009190 - [DE] Verfahren und Anordnung zur Erzeugung einer Daten-Bitfolge durch Abtasten eines digitalisierten Rauschsignals; DPMA, 2006
- Braeunig M., Faul T., Walach H., REG-Array with non-deterministic time scheme for PK studies; Proceedings of the Parapsychological Association Convention, 2005

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