

## Ongoing Projects

Investigation of EEG baseline with drones

EEG spectral signature of the impact of mindfulness meditation on perceptual-motor awareness and Self-agency.

Conscious Induction of a Theta Rhythm in the EEG by a Healing Procedure

Intensity and duration of needling sensations – a pilot study in osteoarthritis patients

Beyond anthropocentric empathy: ERP dynamics of empathy for non-human beings and ecosystems

Messung und Analyse von EEG und peripheren physiologischen Daten während Meditation von erfahrenen Meditierern

Analyse und Klassifikation von Gehirn- und Bewusstseinszuständen mit Hilfe von EEG bei Meditation

The neural basis of mindfulness meditation: A high-resolution EEG study of novices and long-term meditators

The impact of mindfulness meditation on visuomotor performance and awareness of action: an EEG study of short- and long-term meditators.

Identifikation einer neurophysiologischen Schmerzsignatur bei chronischen Rückenschmerzen und deren Veränderung durch eine verhaltensmedizinische Intervention – eine Pilotstudie

Vergleich zweier verhaltensmedizinischer Interventionen zur Behandlung von Migräne – eine klinische Pilotstudie

Self-Compassion: Ein neues Konzept positiver Selbstzuwendung. - Eine deutsche Adaptierung der „Self-Compassion Scale“

Meditation im Fokus - Wie beeinflussen verschiedene Meditationstechniken das Aufmerksamkeitssystem?

## Completed Projects

Use and comprehension of complementary and alternative medicine in breast cancer patients

Reproduzierbarkeit des Unterdrucks beim Schröpfen

Die neuronale Basis der Achtsamkeitsmeditation: Eine hochauflösende EEG-Studie an Lang- und Kurzzeitmeditierenden.

Die Auswirkung von Achtsamkeitsmeditation auf das visuomotorische Bewegungsverhalten und die Handlungswahrnehmung: Eine EEG Studie mit Kurz- und Langzeitmeditierenden

Identifikation einer neurophysiologischen Schmerzsignatur bei chronischen Rückenschmerzen und deren Veränderung durch eine verhaltensmedizinische Intervention – eine Pilotstudie

Evaluierung der gesundheitlichen Wirkungen bei Exposition gegenüber Schienenlärm unter besonderer Berücksichtigung der DB-Trasse Basel-Offenburg (und der Haltbarkeit des Schienenbonus)

Fibromyalgie

Subjektive Vorstellungen von Schmerz und Leiden bei Frauen mit Fibromyalgie

Qualitative Untersuchung zum Thema „Achtsamkeit in der Paarbeziehung“

Terra-Pro Studie

Präkognition in organisatorisch geschlossenen Systemen

T.REG - A Triggered Random Event Generator for Basic Research in Complementary and Alternative Medicine

The Meaning-switch - Investigation of precognition in an operationally closed system

Empirische und theoretische Untersuchung der Verallgemeinerten Quantentheorie

Remote Staring - Detected by Conscious and Psychophysiological Variables – Combining and Improving two Successful Paradigms r

"Deep Field Relaxation" (Tiefenfeldentspannung) als begleitende Therapie für PatientInnen mit Krebs im fortgeschrittenen Stadium - Eine Pilotevaluation

EEG correlations in distantly located participants

Classical Homeopathy in Treating of Tumor Patients

## Ongoing Projects

### Investigation of EEG baseline with drones

Matthias Braeunig

The EEG baseline is the spontaneous expression of brain activity in the absence of any task. We investigate the temporal dynamic of the resting state in humans with the help of so-called drone sounds. Drones are complex sounds with almost no rhythmic or melodic content. The drone acts as a Ganzfeld-like auditory contrasting condition in the experiment while intrinsic activity may or may not be modified by the sound. A detailed acoustical analysis of the sound structure is combined with robust multichannel EEG measures. The aim of this study is to create a reference scale for experiments with meditators.

[nach oben](#)

### EEG spectral signature of the impact of mindfulness meditation on perceptual-motor awareness and Self-agency.

José Raúl Naranjo and Stefan Schmidt

We have previously assessed the impact of mindfulness meditation (MBSR) on perceptual-motor awareness, self-agency, motor accuracy, reaction time and movement duration in a visuomotor reaching task with false feedback. We compared a group of short-term meditators (SM) participating in the MBSR program with an age and sex-matched control group (CG) receiving no intervention in a pre-post design. We found that SM meditators had lower motor errors than non-meditators, and were considerably slower after the MBSR intervention. We also found that participants in the MS group got aware of a conflict between perceptual and motor information at close to significantly lower levels of angular deviation after the MBSR intervention in comparison to the CG group. This investigation identified, for the first time to our knowledge, positive behavioral signatures of mindfulness meditation in the context of a perceptual-motor integration task. In this present project we aim to study the neural mechanisms underlying these positive behavioral changes, by analyzing the EEG data that was recorded during our previous behavioral study. To our knowledge, the EEG activity associated with the impact of meditation on perceptual-motor awareness and self-agency in a visuomotor task has never been investigated before.

We specifically aim to study the EEG spectral power and coherence signatures related to visuomotor performance and perceptual-motor awareness in the SM group before and after the MBSR intervention and to correlate these EEG signatures with the behavioral data. We predict that the EEG spectral power associated to visuomotor coordination and perceptual-motor awareness will change after the MBSR intervention. Specifically, we expect a decrease of power (in beta band) and an increase of coherence (in gamma band) in different areas within the frontoparietal network most probably in prefrontal, premotor and superior parietal areas. Those effects are expected to be observed specifically in the beta and gamma bands, which are known to be associated with visuomotor control processes, sensory-motor binding respectively.

[nach oben](#)

## **Conscious Induction of a Theta Rhythm in the EEG by a Healing Procedure**

Prof. Dr. Stefan Schmidt

A new healing procedure termed ThetaHealing is making extraordinary claims regarding healing effects and healing mechanism. The method is propagating quickly but so far no scientific evaluation has been conducted. One of the basic claims of ThetaHealing is that the experienced theta healer enters via a special meditation in a so called 'theta state'. According to ThetaHealing alleged healing effects are taking place in this special state which is also induced in the patient by the healer. The name ThetaHealing originates from the fact that this 'theta state' is correlated with strong theta rhythmic activity patterns (4-7Hz) in the respective EEG of healer and patient. We will set out to assess this claim in a dual EEG study where we will record simultaneously EEG from 10 experienced Theta Healers and 10 naïve patients. We hypothesize that (i) the healer taught in this method can elicit theta rhythmic activity at will in his/her EEG. (ii) there will be an increase of theta rhythm brain activity in the patient once the ThetaHealer tries to connect to his/her state to the patient and (iii) there will be significant more correlational patterns between the healer's and the patient's EEG once both are in the so called theta state compared to a control condition.

[nach oben](#)

## **The neural basis of mindfulness meditation: A high-resolution EEG study of novices and long-term meditators**

Stefan Schmidt and Jose Raul Naranjo

The scientific community has witnessed in the last decades an increasing interest on the impact of meditation practices on the human mind and body. In particular, electrophysiological and neuroimaging approaches to concentrative forms of meditation has deepen our understanding of the brain processes underlying meditation practices. In contrast, a different group of meditation techniques termed mindfulness meditation has raised a lot of attention in the health sciences. Since mindfulness meditation research has proven the efficacy of several mindfulness interventions in clinical studies, a quest for the neural mechanisms associated with these benefits is strongly justified. An early study (Dunne et al., 1999) showed that mindfulness meditation produced relative more slow (delta and theta) and relative fast (alpha and beta) oscillatory activity than a concentration meditation condition. Nevertheless, EEG changes in the gamma range and large-scale integration process assessed by cortico-cortical coherence during mindfulness meditation has not been investigated so far. The aim of this project is to investigate both issues in detail, by studying the spontaneous EEG activity, specifically mindfulness-related power and coherence changes. We will provide a high-resolution EEG topography of the mindfulness state in two different samples. The first sample will consists of long-term mindfulness meditators, recruited through contacts with several meditation centres in Europe. The second sample will consist of novices which undergo an eight weeks health program based on the mindfulness approach termed 'Mindfulness Based Stress Reduction (MBSR)'. This project has several advantages in its design and methodology compared to earlier works. Firstly we will analyze and compare both novices and long-term meditators. Secondly we will provide a complete description of all frequency bands. Thirdly we will use a high resolution EEG recording system (64 channels), and finally, we will complement our EEG study with a cortico-cortical coherence analysis, to study the pattern of long range interactions among the different activated cortical areas. This approach will ensure an important contribution for the research into the neurophysiological correlates of the mindfulness state. This is highly needed in order to understand the mechanisms of the positive clinical findings of mindfulness based interventions.

[top](#)

## **The impact of mindfulness meditation on visuomotor performance and awareness of action: an EEG study of short- and long-term meditators.**

Stefan Schmidt and Jose Raul Naranjo

Awareness of action and the attribution of agency are key issues in the neuroscientific study of consciousness. Attribution of agency involves the ability to distinguish our own actions and their sensory consequences which are self-generated from those generated by external agents. The interplay between perceptual awareness and motor awareness may be an important clue towards understanding how the brain distinguishes between self-generated and external events, and towards understanding both the brain processes and the conscious experience of being an agent. There are several pathological cases in which motor awareness is dramatically impaired. On the other hand, practices like meditation can enhance cognitive processes related to self-agency as e.g. inward-attention and self awareness. Although several EEG studies have assessed the specific impacts of meditation on brain activity, perceptual processes, and consciousness itself, it is still unclear how meditation changes sensory-motor integration processes and awareness of action. Some studies have reported contradictory results about the impact of meditation on motor performance, and associated changes in the periphery. The general aim of this project is to investigate not only visuomotor performance and the subjective reports of self-agency, but also the cortical correlates of the control and awareness of actions in mindfulness meditators. This will be done by studying the EEG activation pattern during a conflicting sensory-motor reaching task, where the congruency between actions and their consequences is gradually altered. This task will be presented to novices in meditation before and after 8 weeks of meditation training. The data of this sample will be compared to a group of long-term meditators and a group of healthy non-meditators.

[top](#)

## Completed Projects

### Use and comprehension of complementary and alternative medicine in breast cancer patients

Esther Tautz, Corina G uthlin

Female breast cancer patients belong to the most frequent users of complementary and alternative medicine (CAM). The study at hand was designed as a cross-sectional survey examining how many women with breast cancer use CAM parallelly to their conventional treatment, and which CAM methods are most frequently used. We wish to evaluate the demand for CAM and CAM consultation in a conventional medical setting like a university hospital. Further important aspects are the expectations of patients concerning CAM and their satisfaction with the complementary treatment they chose. Especially regarding the risk of interactions with the standard medical treatment, we wish to find out whether the additional CAM therapies are communicated to doctors inside and outside the clinic and how this information is handled by them. Approximately 200 patients have by now been included into this study, either with a recent diagnosis of breast cancer or with a recurrence or metastatic disease. We questioned patients in the Klinik f ur Tumorbologie and in the University Hospital Freiburg. Our goal was to include both patients in an early stadium of disease and in a palliative situation or being free of recurrence even for a number of years. Surveys performed during the last years show significantly varying rates of CAM use. These differences may be due to misunderstandang of the questionnaires, problems of memorization or different definitions of CAM by the patients or even by the interviewers themselves. Until now, this issue has never been examined in studies about CAM. Therefore we conducted depth interviews to gain insight into the cognitive processes involved while answering questions, also examining the patients` understanding of CAM methods. This study is supported by the Karl und Veronika Carstens foundation.

[top](#)

### T.REG - A Triggered Random Event Generator for Basic Research in Complementary and Alternative Medicine

Matthias Braeunig und Tilmann Faul

Basic research in alternative medicine requires models of self-healing to adequately describe the effect low dose interventions in integrated systems that have a high degree of autonomy and self-reliance. In order to model certain aspects of an operationally closed network of triggers we have developed a device and setup that can otherwise be seen as a man-machine interaction experiment. It consists mainly of an electronic circuit that samples high frequency digital noise at moments determined by external or internal triggers, the outcome being a binary stream of data similar to that of a coin tossing experiment. (Fig. 1)

Its earmarking feature is an explicit trigger-feedback loop, by which the result of the sampling is suitably fed back to the device as newly generated triggers. Sampling takes place without time granulation (no grid) in less than 10ns off the triggers. Furthermore the system is running several random sources (channels) in parallel that can receive one and the same or different triggers according to a choice of setup configurations. (Fig. 2) The design is most flexible by use of latest FPGA technology.

We have tested three configurations with hypothesized increasing degree of integration: (1) fixed frequency triggers, (2) self-triggering through voltage controlled oscillator (VCO), (3) physiological triggers using subjects EEG signal. (Fig. 3) In all three cases a human participant tries to alter the probability of events to occur, receiving instant acoustic feedback of the outcome.

In addition to the possibility of human intention affecting the probability of successes in the outcome through the generation of triggers, a new method has been introduced by which the level of states to be sampled is inverted by application of a press button. This so-called Meaning-Switch, or M-Switch can reverse the meaning of hits and misses of future events while the button is held pressed. (Fig. 4) The agent in an experiment is asked to deliberately alter the meaning of events when the events generated are opposite to intention. It was conjectured that the overall success rate can be influenced "by looking into the future".

Experiments suggest that the variance measure is increased in highly integrated setups like (3) with M-Switch while the cumulative mean value is not affected. Interesting psychological factors can be extracted.

The project was funded by BIAL Foundation (Portugal) and has been completed in 2006. A detailed summary report is [available](#) from the authors.

[top](#)

### **The Meaning-switch - Investigation of precognition in an operationally closed system**

Matthias Braeunig and Tilmann Faul

The regulatory function of operationally closed networks is a well-known fact and of fundamental significance for complementary medicine. Biofeedback systems play an increasingly important role for medical research.

We investigated a model of an operationally closed system with random input. An electronic device called triggered random event generator (T.REG) samples binary digits from a random stream of states. Triggers are produced from physiological measurement (EEG) of a human operator, who seeks to alter the hit rate of the device. The subject receives instant acoustic feedback about the mean score and tries to alter the direction of tones. Earlier experiments have shown significantly increased variability under certain experimental conditions. Of special interest to us is the attribution of meaning in the process and various psychological variables that can be extracted from our data.

It turned out that the previous result about increased variance could not be replicated. But a mean shift was observed for trials triggered off a pseudo-random source, where true random events seemed almost normal. We have reasons to believe that subjects can tell random sequences from natural and artificial sources apart, although that difference was not shown to be significant. A number of interesting psychological factors involving the so-called Meaning-switch have been observed. The number of significant correlations between physical and psychological variables was increased, indicating non-separability.

The project was funded by the Bial Foundation, Portugal, under contract number 98/06. All results are documented in a comprehensive [summary report](#).

[top](#)

### **Remote Staring - Detected by Conscious and Psychophysiological Variables – Combining and Improving two Successful Paradigms**

Susanne Müller und Stefan Schmidt

Findings in parapsychology suggest an effect of distant intentionality. Two laboratory set-ups explored this topic by measuring the effect of a distant intention on psychophysiological variables. The DMILS (direct mental interaction in living systems) experiments investigate the effect of various intentions on the electrodermal activity (EDA) of a remote subject. The "Remote Staring" experiments examine whether gazing by an observer (starer) covaries with the electrodermal activity of the person being observed (staree).

In two meta-analyses (Schmidt, Schneider, Utts & Walach, 2004) it became obvious that the remote staring studies had a lower overall quality than the DMILS studies. While there are some high quality DMILS studies (score over 90%) the highest quality in Remote Staring studies is 71%. Thus there is a lack in studies with good methodology to assess the remote staring paradigm.

We conducted a remote staring study that intended to overcome methodological shortcomings of earlier studies

Fifty participants were invited to take part as starees. After completing questionnaires on mindfulness, mood, personality and paranormal belief they rested in a comfortable position in front of a video camera while their EDA was continuously monitored. The experimenter also acted as the starrer and either observed or did not observe the participant through a closed circuit television system according to a random schedule. EDA during stare and non-stare epochs was compared for significant differences.

In addition to this basic (replication) set-up two new hypotheses were tested. The participant had the possibility to press a button whenever s/he feels stared at. This added a conscious response variable without engaging into the disadvantages of the standard conscious guessing paradigm (guessing strategies, response bias etc). Furthermore the distraction of the starrer's intention during non-stare epochs was varied. In one condition s/he was mentally occupied by a cognitive task, in the other s/he was just told not to stare (standard condition). We hypothesized that the distraction from the target in the standard condition was too weak to avoid an unwanted intentional effect in the staree.

Overall we did not find any staring effect at all, not in the EDA data and not in the 'conscious' open response situation. The difference between the conditions where the sender was distracted or not distracted was not significant ( $p=.07$ ) but for the condition where the starrers were distracted ( $N=20$ ) we found a medium effect size for a staring effect according to our hypothesis of  $d/ =.43$  ( $p /=.085$ ) for the difference between staring and non staring epochs. This exploratory finding gives support to the hypothesis that the starrer's distraction of his or her attention during the non-staring epochs might be a crucial factor in the remote staring research. We suggest that this hypothesis should be followed-up on a larger sample.

Publication and results:

Müller, S., Schmidt, S. & Walach, H. (2006). Remote staring detected by conscious and psychophysiological variables. Combining and improving two successful paradigms. The Parapsychological Association 49th Convention. Proceedings of presented papers (pp. 85-99).

The study was funded by the BIAL Foundation, Portugal.

Realisation: 2004 – 2006

Contact:

[Dr. Stefan Schmidt](#)

[top](#)

## **"Deep Field Relaxation" (Tiefenfeldentspannung) als begleitende Therapie für PatientInnen mit Krebs im fortgeschrittenen Stadium - Eine Pilotevaluation**

Susanne Müller, Christian Seiter, and Clif Sanderson

**Aims:** Many cancer patients, especially in late stages, seek out alternative treatments, and often they use spiritual healing. We offered a certain kind of healing, Deep Field Relaxation to cancer patients in end or late stages of their disease. We wanted to study the immediate and mid-term subjective effects and find out whether the treatment was worth further investigation.

**Methods:** The therapy involves a deep form of relaxation by the therapist entering a quiet mental space on behalf of the patient. We conducted open interviews around predefined topics before, immediately after and a third time after 8 weeks and collected questionnaire (FACT-G), as well as medical data. Evaluation of interviews followed an inductive approach similar to a grounded theory model.

**Results:** 18 patients were treated and interviewed. Data suggest that none of the patients reported any negative experiences. Positive experiences varied in intensity and longevity. While five patients who had considerable previous experience with meditation or relaxation techniques found the treatment relaxing and positive but without any lasting effects and two patients were too vague about their experiences, all other patients reported experiences of deep relaxation and positive feelings. Not all of them attributed these to

the treatment itself. Patients experienced the relationship and the therapeutic situation positively without exception. Being and feeling accepted as they are, with their disease, allowed patients to accept themselves. This had personal impacts to varying degrees.

Conclusions: Deep Field Relaxation is a viable and generally accepted treatment that deserves further study. It remains to be seen whether apart from those obvious subjective improvements any changes of projected medical prognoses will be traceable.

This study was funded by: Gesellschaft zur biologischen Krebsabwehr e.V.

Publication and results: [Walach, H., Schwarzer, T., Boehncke, A., Lucius-Hoene, G., Müller, S., Seiter, C., Weis, J. \(2007\) Subjective Effects of Deep Field Relaxation, a Form of Spiritual Healing, on Cancer Patients - A Qualitative Study. Poster presented at the International Congress on Complementary Medicine Research, Munich, May 11-13.](#)

[top](#)

## EEG correlations in distantly located participants

Stefan Schmidt, Devi Erath, Harald Walach (University of Northampton) and Thilo Hinterberger (University of Northampton)

The aim of this study is a replication of investigations concerning telepathic communication using an improved experimental design. Telepathic contact has been an important issue of scientific parapsychological investigation throughout. Since about 1960, researchers try to turn these ideas into an experimental design which can provide evidence for physiological correlates of a telepathic communication between two people. Several studies found significant correlations in the electroencephalogram (EEG) or in functional magnetic resonance imaging (fMRI) which indicate an unconscious telepathic connection. This study verifies if there is a correlation in the EEG of distantly located pairs of participants who are emotionally closely bonded when one person is visually stimulated. To maximise sensorical and electromagnetic shielding of participants from each other and to prevent local information transfer, subjects are located in different places for the experimental sessions: one person will be in the lab of the Institute of Environmental Medicine, Freiburg, Germany, the other person in the lab of the University of Northampton, UK. As visual stimuli we take pictures of an international data set. We measure participants' skin conductance and EEG. Additionally, we ask participants to fill out a questionnaire concerning the kind of relationship they have with their experiment partner to analyse whether correlations between these data and the psychophysiological measurements can be found.

[top](#)

## Classical Homeopathy in Treating of Tumor Patients

Corina GÜthlin

The aim of the study is to answer the question if cancer patients benefit from homeopathy. This prospective, explorative, multi-centre cohort study includes also a matched-pairs comparison.

Over the course of 2 years we include every patient coming either to a homeopathic outpatient clinic or to an oncologist delivering standard care into the protocol, who consents to the study. It is important to say that we do not intervene with the care given to the patients; the aim is to document effects of the "standard procedure" (be it homeopathy or conventional care) given by the clinic or practice. This is a prospective cohort study with a matched pairs comparison nested within. The matching procedure allows for matching patients having the same prognostic score, whereby only patients in palliative state will be included into this part of the study. Outcome variables will be quality of life (as measured by the FACT questionnaire) and survival status. The research question within the cohort study is 1. to describe the differences of cancer patients seeking for homeopathy as compared to cancer patients getting conventional care. 2. to describe the conventional and unconventional treatments patients get and actively seek for within the course of their cancer disease. The research question within the matched-pairs comparison is to compare survival (for 5 years) and quality of life (for 1 year) of cancer patients having the same prognosis when starting treatments.

[top](#)