

Trends in Medical Psychology

CvO University Oldenburg, 20.10.2023

NeSSy-Building (W30), room 033/034, K pkersweg 74

Scientific program

09:15 – 09:30	Introduction by Prof. Dr. Christoph Herrmann, Oldenburg
09:30 – 10:00	Dr. Maximilian Bruchmann , M�nster <i>Emotion effects on the N170 to faces: the role of facial features, attention and consciousness</i>
10:00 – 10:30	Dr. Vera Moliadze , Kiel <i>From Optimization to Personalization: Factors that Interact in Neurostimulation</i>
10:30 – 11:00	break
11:00 – 11:30	Dr. Anne K�hnel , Bonn <i>Trust your gut: Targeting bodily feedback signals to improve adaptive responses to challenges</i>
11:30 – 12:00	Dr. Anja Ophey , K�ln <i>Cognition in Transition: Unraveling and Modulating Cognitive Functioning from Healthy Aging to Neurodegenerative Diseases</i>
12:00 – 13:00	lunch break
13:00 – 13:30	Keynote Speaker Prof. Dr. Jochen Kaiser , Frankfurt <i>Neurocognitive basis of working memory</i>
13:30 – 14:00	PD Dr. Maren Schmidt-Kassow , Frankfurt <i>Cognitive effects of Motion, Stress, and Neuromodulation</i>
14:00 – 14:30	Dr. Philipp A. Schroeder , T�bingen <i>Leveraging Low-Intensity Neuromodulation Targets for Mental Disorders</i>
14:30 – open	Discussion

Abstracts

Emotion effects on the N170 to faces: the role of facial features, attention and consciousness

Dr. Maximilian Bruchmann, Münster

The N170, a negative component of the event-related potential, is reliably potentiated in response to emotional versus neutral facial expressions. I will present recent findings suggesting that this valence differentiation occurs highly automatically but is based on integrated, holistic facial processing rather than isolated features or spectral properties. Next, blinding paradigms, such as continuous flash suppression or the attentional blink, are used to test whether the N170 differentiates between emotional expressions even in the absence of conscious perception. I will discuss how the research field could profit from utilizing suited neuromodulatory methods.

From Optimization to Personalization: Factors that Interact in Neurostimulation

Dr. Vera Moliadze, Kiel

The effects of transcranial stimulation on neurophysiology and clinical outcomes are influenced by a range of factors. One of the most challenging tasks in transcranial stimulation is to both reduce variability and enhance the effectiveness of the stimulation. This can be partially achieved through the use of personalized neuroimaging techniques, computer-assisted modeling, and the application of neuronavigation during stimulation. These approaches enable a more precise quantification of electrode placement and the intensity of electrical/magnetic fields, contributing to the reduction of variability. Furthermore, identifying the main components of variability and developing strategies for improvement is crucial in ultimately deriving recommendations for reducing variability in future clinical studies.

Trust your gut: Targeting bodily feedback signals to improve adaptive responses to challenges

Dr. Anne Kühnel, Bonn

How we adapt to the challenges of the environment determines long-term health. Consequently, acute and chronic stress are risk factors for many mental disorders, such as mood and anxiety disorders. Adaptive responses are not purely dependent on brain circuits. Since bodily feedback plays a crucial role in behavioral adaptations, targeting such signals with non-invasive stimulation techniques may open new avenues.

First, I will show how acute stress induces spatio-temporal brain response signatures that predict transdiagnostic risk factors for mental disorders. I also relate stress-induced brain response profiles to overweight and obesity, highlighting the interplay between mental and physical health. Negative affectivity and a higher BMI were associated with stress-induced changes in the insula and limbic regions. These regions integrate bodily feedback signals and may be targeted by transcutaneous vagus nerve stimulation (tVNS). Second, I apply tVNS to affect learning, motivation, and mood, all part of adaptive responses to our environment. I will then demonstrate the potential of tVNS to modulate brain responses in interoceptive hubs that critically shape adaptive responses to environmental challenges, such as the insula. Last, I will give an outlook on how tVNS might be optimized to target communication between the body and the brain. The talk will collectively show how adaptive responses are altered transdiagnostically in mental disorders and present how non-invasive brain stimulation may help normalize responses to challenges by affecting the integration of bodily feedback signals.

Cognition in Transition: Unraveling and Modulating Cognitive Functioning from Healthy Aging to Neurodegenerative Diseases

Dr. Anja Ophey, Köln

One of the primary health challenges that Medical Psychology can contribute to is the transition of cognitive functioning in healthy aging, prodromal and clinical Parkinson's disease, and other neurodegenerative conditions susceptible to cognitive decline. By exploring determinants of preserved cognitive health and neural correlates of cognitive decline, the aim of my on- and off-campus collaborative work in the team of Medical Psychology at the Medical Faculty of the University of Cologne is to illuminate relevant targets for neuromodulatory interventions in the age of precision medicine. Consequently, the effects and mechanisms of cognitive and neural plasticity following non-pharmacological interventions, e.g., cognitive training, operationalized by multimodal endpoints (e.g., neuropsychological testing, accelerometry, MRI, polysomnography), are investigated, offering valuable insights for both clinical practice and research.

In my role as the teaching coordinator, I am dedicated to nurturing an inclusive, interdisciplinary teaching and learning environment at the intersection of psychology, neurology, and neuroscience – particularly for medical students, but also by supervising students from Psychology and Neuroscience. In 2020, I initiated the development of a new teaching concept for the subject of Medical Psychology at the Medical Faculty of the University of Cologne, which is now implemented within our team involving diverse, sustainably designed blended learning scenarios (face-to-face and in flipped classroom formats) with a well-balanced mix of theoretical, clinical, and up-to-date research insights, promoting a deep engagement with the learning objectives, for example in a weekly journal club for medical students.

Keynote: Prof. Dr. Jochen Kaiser, Institute of Medical Psychology, Medical Faculty, Goethe University Frankfurt

Neurocognitive basis of working memory

This presentation will give a brief overview of research and teaching in medical psychology at the Frankfurt medical faculty. As part of the Brain Imaging Center, we focus on basic cognitive neuroscience investigations of neural and cognitive aspects of auditory and visual perception and working memory. In addition, we have studied neurocognitive processing in disorders including addiction, autism and dementia. Our teaching focuses on the relevance of psychological functions for bodily processes and on research methods.

Cognitive effects of Motion, Stress, and Neuromodulation

PD Dr. Maren Schmidt-Kassow, Frankfurt

In the current talk, I will discuss three main areas of my research.

Firstly, I will present EEG- and behavioural data on how rhythmic motor activity during stimulus presentation, in particular, auditory-motor synchronisation, influences learning and attention processes. Secondly, I will introduce a current project on the influence of acute and chronic stress on emotion recognition in speech and the potential modulatory effect of a rhythmically vibrating custom-made device. The third and final section focuses on two neuromodulation initiatives (tDCS and TMS). These initiatives are aimed at translating basic research into clinical practice.

Leveraging Low-Intensity Neuromodulation Targets for Mental Disorders

Dr. Philipp A. Schroeder, Tübingen

Neuromodulation methods such as non-invasive brain stimulation or neurofeedback are increasingly employed to manipulate cortical activity systematically and safely, providing a brain-based approach for the characterization and treatment of neurological and mental disorders. In this talk, I particularly focus on low-intensity neuromodulation such as transcranial direct current stimulation (tDCS), which has a potential for broad adoption across the lifespan, good safety and acceptance, and pragmatic advantages. However, neuromodulation targets for tDCS are not trivial to define. Through a series of

experimental studies, I will investigate the possibilities to target i) inhibitory control functions in healthy controls and samples at risk of overeating, ii) implicit biases with neutral and addiction-related stimuli, and iii) novel technical developments in multimodal and high-definition tDCS. Overall, study results indicate that tDCS is very sensitive to various psychological manipulations and moderator variables. Further advancing the field will require robust research designs, clear target definitions and extensive monitoring in order to tailor tDCS protocols to medical conditions and augment the existing evidence-based treatment options.