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Europäische
Biofeedback-Akademie

Welcome to Hamburg

Contents

Useful Information

Timetable

Thursday | 30. May 2024

Keynote

Human defensive reactions and their role in approach-avoidance decision making

Karin Roelofs

Donders Institute for Brain Cognition and Behavior, Radboud University Nijmegen

Thursday 09:15 - 10:15 | ORT

Behavioural scientists often assume that automatic defensive threat reactions, while essential in explaining animal behavior, only have limited value when it comes to understanding human behavior. There is, however, increasing evidence that defensive reactions, such as freezing, have an impact on subsequent approach-avoidance decisions under acute threat in humans. Understanding the mechanisms that drive such decisions is particularly relevant for patients with anxiety disorders, whose persistent avoidance is key to the maintenance of their anxiety. In recent years, computational psychiatry has made substantial progress formalizing the mechanisms through which we make (mal)adaptive decisions. However, most current models simply ignore the transient psychophysiological state of the decision maker. Here, I argue that the balance between para-sympathetic and sympathetic activity is instrumental in driving the psychophysiological state of freezing, and that it influences approach-avoidance decisions under acute threat in different ways. To illustrate, I first explore the effects of freezing on different kinds of human action decisions under threat. Next, I discuss recent translational (rodent-human) work that has helped to characterize the neural mechanisms implicated in animal and human defensive freezing. Finally, through two prospective longitudinal studies, I show that individual differences in susceptibility to freezing are predictive of the development of anxiety symptoms. Overall, this work suggests that defensive threat reactions and associated psychophysiological states not only affect acute decision making, but also predict long-term symptom development. As such, these factors have great importance for resilience research, and should constitute an integral part of any theory of human decision making.

Symposia session 1

S01 - Exploring new approaches to increase utility of psychophysiological markers for clinical psychology

Donnerstag 10:30 - 12:00 | Ort TODO

Session chair(s): Julia Klawohn, Hannes Per Carsten

University of Hamburg

In recent years, biological markers have increasingly been incorporated into clinical research, showing they can further our knowledge of pathophysiological mechanisms underlying mental health problems and help identify new vantage points for interventions. Yet, despite these advances, limitations regarding robustness and effect sizes of associations between biological processes and clinical phenotypes remain and hamper practical utility of existing findings. This symposium will cover several studies that all attempt to improve bridging this gap by applying innovative experimental approaches or interventions, combining measures or methods, exploring underlying dimensions, or incorporating individualized materials. Kai Härpfer will present a large study spanning clinical and subclinical individuals, highlighting the importance of familial risk and lifetime diagnoses for variations in error-monitoring ERPs. Rosa Grützmann will show effects of a novel cognitive training aimed at reducing overactive error-processing in obsessive-compulsive disorder. She further demonstrates that a combination of several ERP markers can help improve diagnostic classification of mental health issues, like problematic internet use. Hannes Per Carsten extends the modification approach showing that VR-induced checking behavior may increase error-processing. Mareike Bayer presents a study combining EEG and fMRI to investigate emotional face processing in autism spectrum conditions, with results highlighting the importance of individualized stimuli. Finally, Julia Klawohn will show results indicating that emotional reactivity, as captured with both ERP and cardiac measures, can contribute to predictions of individual psychotherapy success in obsessive-compulsive disorder. Together, these findings capture the complexity of links between psychophysiological markers and psychopathology and propose leverage points for translational research strategies.

Härpfer K. Enhanced performance monitoring within the anxiety and obsessive-compulsive spectrum: A transdiagnostic and dimensional perspective | 10:30

Grützmann R. Utility of psychophysiological markers of executive functions: Examples from clinical application in obsessive-compulsive disorder and problematic internet use | 10:45

Carsten H. Repetitive Checking in Virtual-Reality Alters the Error-Related Negativity: Evidence from a Randomized Controlled Trial | 11:00

Bayer M. Temporal and spatial characteristics of emotional face processing in Autism Spectrum Conditions | 11:15

Klawohn J. Employing psychophysiological markers to predict treatment effects in obsessive-compulsive disorder | 11:30

S02 - Leveraging Single-Trial Electrophysiological Data in the Cognitive Neurosciences: Implementations, Insights, and Challenges

Donnerstag 10:30 - 12:00 | Ort TODO

Session chair(s): Norman Forschack

Max Planck Institute for Human Cognitive and Brain Sciences, Max Planck Institute for Human Cognitive and Brain Sciences

Electrophysiological recordings have been instrumental in unraveling the brain's functional dynamics, offering insights into neural processes underlying perception, cognition, and behavior. In recent years, there has been a growing interest in the analysis of single-trial electrophysiological data, which holds the promise of unveiling the brain's intricate temporal dynamics on a trial-by-trial basis. The symposium aims to explore the wealth of knowledge that can be derived from investigating single-trial data and to address the unique challenges that researchers face in harnessing its potential. Specifically, the symposium asks how utilizing single-trial data helps to characterize and conceptualize general principles of neural processing and what we can learn about general neural mechanisms underlying perception, cognitive functions, and behavior. The work discussed in the symposium will focus on the analysis of neural measures such as 'traditional' event-related potentials (ERPs), oscillatory activity, and 'new' measures like signal entropy as well as single-trial behavioral measures. By showcasing recent experiments, we will explore emerging technologies and computational tools that can aid in the analysis of single-trial data, such as spectral decomposition, denoising procedures, information theoretic measures, and Bayesian statistical modeling approaches. We present how these novel methodologies are implemented to explicitly probe and uncover general neural mechanisms underlying perception and cognitive functions. In a joint discussion, we will deepen our understanding of the advantages, limitations, conceptual assumptions, and prerequisites as well as the obstacles of analyzing single-trial data to advance our understanding of the dynamic processes of the brain and their relationship to human cognition and behavior.

Studenova A. On the relevance of oscillations in generation of evoked responses | 10:30

Gundlach C. Alpha-band fluctuations and their role in behavioral performance in a probabilistic spatial cueing design: Attentional resource allocation or consequence of top-down guided shifts of spatial attention? | 10:50

Keitel C. Time-on-task explains variability in oscillatory brain-behaviour relationships; | 11:10

Kloosterman N. Leveraging trial-to-trial neural dynamics to understand human cognition; | 11:30

S03 - Cognitive Brain States from a Network Neuroscience Perspective

Donnerstag 10:30 - 12:00 | Ort TODO

Session chair(s): Kirsten Hilger

Würzburg University

Brain states are recurring patterns of distributed brain activity. Such states originate from the brain network's structural scaffold and offer insight into the complex operations enabling human cognition. Understanding their spatio-temporal properties, their occurrences as well as their transitions holds promise for deciphering the neurobiological bases of cognitive processes, individual differences and disease-specific alterations. This symposium focuses on brain states arising from specific cognitive demands and discusses their potential influence on behavior. We showcase five contributions that employ experimental paradigms to explicitly trigger brain states of active cognition or provide an environmental context for interpreting the behavioral implications of brain state changes. All contributions utilize techniques from network science or artificial intelligence (AI) as common methodological framework. We explore various aspects of brain states, beginning with states emerging from effortful cognitive processing during an established intelligence test. Next, the utilization of recurrent neural networks to simulate brain state dynamics during different cognitive tasks will be explored and the "complexome" will be introduced. Finally, memory-related brain states and their alterations during cognitive aging will be presented, and the examination of changes in brain states following cognitive training interventions will be outlined in the context of clinical applications. Following these individual contributions, we will conclude the symposium with a podium discussion. This discussion will focus on opportunities and challenges induced by the study of brain states with techniques of network science and AI by considering conceptual and methodological boundaries.

Thiele J. The neural code of human intelligence: A multi-modal exploration of brain states during the Ravens matrices test | 10:30

Frank O. Common principles of cognitive functions in human brain and artificial networks | 10:45

Krohn S. The "complexome" – a spatiotemporal complexity architecture of human brain activity | 11:00

Richter A. Unveiling neurocognitive aging through comprehensive fMRI scores | 11:15

Valk S. Structural and functional network re-organization following social mental training | 11:30

S04 - Perception under uncertainty

Donnerstag 10:30 - 12:00 | Ort TODO

Session chair(s): Franziska Knolle

University of Marburg

In recent years, there has been a growing understanding of the brain as a predictive entity (Friston, 2010; Clark, 2013; Yon & Frith, 2021). Given the often noisy and ambiguous nature of sensory input, coupled with its indirect accessibility, our perception of the environment is covered in uncertainty. Consequently, the brain must construct a model of the world to anticipate or predict future events and infer their causes. Formalised in the Bayesian brain hypothesis, prior knowledge is combined with sensory likelihood to generate percepts, and prediction error - the difference between what has been expected based on the prior and the sensory input - are used to update the model and minimise prediction errors in the future (Rascola & Wagner, 1972). However, due to the probabilistic nature of the prior knowledge and sensory likelihood, the model must be flexible enough to tolerate inaccuracies and yet adaptable to change, despite the relative uncertainty of prediction errors. Interestingly, imbalances between precision of prior knowledge and precision of sensory likelihood may result in false percepts and may even explain the emergence of clinical symptoms, such as hallucinations or delusions. While this may explain how the brain reacts to uncertainty, the underlying mechanisms still remain poorly understood, requiring empirical evidence. With this symposium, we are, therefore, bringing together recent evidence from different experimental studies using behaviour, TMS, EEG, MEG, and computational modelling in clinical and non-clinical samples to investigate how uncertainty impacts perception within different modalities in clinical and non-clinical populations.

Eckert A. Cross-Modality Evidence for Reduced Choice History Biases in Psychosis-Prone Individuals | 10:30

Peylo C. Oscillatory signatures of predictions in social and sensory perception | 10:45

Haarsma J. Shared and diverging neural dynamics underlying false and veridical perception | 11:00

Sterner E. Alterations in predictive language processing are associated with schizotypal and autistic traits | 11:15

Knolle F. Alterations in the use of prior semantic knowledge relative to sensory information from acute psychosis to psychotic remission: a longitudinal approach | 11:30

S05 - Neuromodulation - current challenges in method optimization

Donnerstag 10:30 - 12:00 | Ort TODO

Session chair(s): Thomas Dresler, Miroslava Jindrova

Johannes Gutenberg University Medical Center, Leibniz Institute for Resilience Research

Neuromodulation is a promising field employing various techniques (e.g. electric/magnetic stimulation, neurofeedback) to modulate brain activity and brain states in order to improve clinical symptoms or to investigate specific functions of different brain regions. Although the initial results of its clinical application seem promising, optimization and personalization of these methods are needed to advance treatment. In this symposium, we will provide an overview of different neuromodulation methods that have been investigated as potential clinical treatments for various mental disorders. The main focus will be on current challenges in optimizing these methods, including their combination with various neuroimaging modalities to achieve personalization and enhance the intended clinical effects. First, Maximilian Lückel will talk about the personalization of transcranial magnetic and ultrasonic stimulation by combining them with MRI. Second, Magdalena Mischke will report on the use of transcranial direct current stimulation to alleviate post-COVID fatigue and how individual electrophysiological and immunological parameters can predict outcomes and potentially optimize stimulation. Third, Beatrix Barth will elaborate on different targeting approaches of the motor cortex during functional near-infrared spectroscopy neurofeedback (NF) and their effects on the underlying processes of NF learning. Finally, Miroslava Jindrová will give an overview of NF training for emotion regulation, compare different methods (functional magnetic resonance imaging and electroencephalography), feedback timings, and the use of mental strategies.

Lückel M. Personalized precision neuromodulation by combining transcranial magnetic and ultrasonic stimulation with neuroimaging | 10:30

Mischke M. The influence of transcranial direct current stimulation on post-COVID fatigue: a comprehensive analysis of the electrophysiological and immunological influences | 10:50

Barth B. Exploring underlying mechanisms of real-time single region neurofeedback, functional connectivity neurofeedback and support vector machine neurofeedback | 11:10

Jindrová M. The way to optimization of neurofeedback training protocols for emotion regulation | 11:30

Symposia session 2

S06 - Facets of (a)motivation: effort-based decision-making in health and disease

Donnerstag 13:00 - 14:30 | Ort TODO

Session chair(s): Mario Bogdanov

University of Hamburg

Motivation constitutes an essential requirement for any form of goal-directed behavior. Yet, people's willingness to perform actions for desired outcomes varies substantially and can be affected by a plethora of intra-personal and environmental factors, such as the individual's affective state or the presence of psychiatric or neurological conditions. However, many of the behavioral and biological mechanisms governing motivated behavior remain elusive. To investigate motivational processes more formally, recent work has started to employ effort-based decision-making tasks grounded in the (neuroeconomic) assumption that individuals modulate effort investment based on a cost-benefit analysis that weighs anticipated task demand against potential rewards. In this symposium, we will present data from recent studies on effort-based decision-making in clinical and healthy populations, highlighting specific motivational deficits observed in current and remitted psychopathology, diverse modulatory influences of stress exposure on motivation, and novel avenues to treatment of amotivation. First, Matthias Pillny presents meta-analytic findings on effort-based decision-making in patients with depressive disorders and schizophrenia, showcasing the transdiagnostic nature of these symptoms. Then, Manuel Kuhn provides evidence for impaired decision-making processes in patients with remitted depression based on computational modeling of choice behavior. Mario Bogdanov will link both recent stress exposure and early-life adversity to reduced effort exertion for reward in the present. In contrast, Kristína Pavlíčková and Dennis Hernaus showcase how acute stress may increase effort expenditure to avoid punishment. Finally, Corinna Schulz will present how manipulations of the body-brain axis may help to increase motivation in patients with major depression.

Pillny M. Effort-Based Decision-Making in psychopathology - A transdiagnostic multilevel meta-analysis | 13:00

Kuhn M. Computational Phenotyping of Effort-Based Decision Making in Unmedicated Adults with Remitted Depression | 13:15

Bogdanov M. Recent stress and early life adversity shape effort-based decision-making in healthy adults | 13:30

Pavlíčková K. Balancing the costs and benefits of avoiding threats | 13:45

Schulz C. From Gut to Goals: Boosting Effort via Modulation of the Body-Brain Axis | 14:00

S07 - Exploring Methodological Challenges and Solutions in Psychophysiological Research: The case example of EEG

Donnerstag 13:00 - 14:30 | Ort TODO

Session chair(s): Johannes Rodrigues

Johannes Gutenberg University

This symposium delves into challenges around validity, reliability, and interpretability of findings while analyzing psychophysiological data. A range of methodological issues will be explored using electroencephalography (EEG) as an illustrative example. First, Mareike Hülsemann discusses the approach of mass univariate analysis with cluster-based permutation testing (Groppe et al., 2011). The advantages and pitfalls of this data-driven approach are illustrated using the example of event-related and time-frequency analysis in the auditory and visual domains. Second, Mario Reutter investigates the influence of analysis decisions on the trade-off between effect size and reliability of the N2pc component in a Dot Probe paradigm. The results are integrated into a multi-level perspective on signal-to-noise ratios and related to the reliability paradox (Hedge et al., 2018). Third, Johannes Rodrigues will present the impact of quantification methods and reference schemes (CSD, linked mastoids, average) on feedback-related negativity (FRN) amplitudes in a trust game paradigm: In addition, the data questions the quality criterion SME provided by Luck et. al., 2021. Fourth, Sven Lesche will introduce a template matching algorithm that can automatically extract ERP component latencies and provides a fit statistic quantifying the degree of certainty in measurement. Results from a simulation study aiming to validate this new approach will be discussed. In summary, this symposium fosters dialogue and innovation to overcome methodological challenges in psychophysiological research.

Hülsemann M. Chances and pitfalls of mass univariate analysis with cluster-based permutation testing for exploratory and hypothesis-driven psychophysiological research | 13:00

Reutter M. The trade-off between effect size and reliability: Insights from a multiverse-analysis of electroencephalographical data within a Dot Probe paradigm. | 13:20

Rodrigues J. Questioning the suitability of the quality criterion SME for EEG data: Exploration of the influence of the quantification method and reference scheme on FRN and SME of FRN amplitudes. | 13:40

Lesche S. Automatically Extracting ERP Component Latencies Using a Dynamic Template Matching Algorithm | 14:00

S08 - Unraveling cognitive and executive functions using human single-neuron recordings

Donnerstag 13:00 - 14:30 | Ort TODO

Session chair(s): Jonathan Daume, Stefanie Liebe

Netherlands Institute for Neuroscience

Single-neuron recordings provide unparalleled insights into neural mechanisms underlying human behavior at cellular resolution. This symposium showcases several lines of research from intracranial recordings in humans that reveal the critical role of single-neuron activity in cognitive and executive functions. Our studies span the dynamic neural underpinnings of language comprehension, the processes underlying memory encoding and control, and the neural disruptions of motor and cognitive aspects in movement disorders. The first talk reveals how pronouns reactivate specific neuron representations of nouns, emphasizing a dynamic semantic memory network crucial for efficient language comprehension. The second presentation challenges a traditional view on the neural implementation of temporal order memory and provides a novel link between sequential memory and stimulus timing using recurrent neural network modeling. The third study explores the regulation of working memory through theta-gamma phase-amplitude coupling, demonstrating how cognitive control and hippocampal single-neuron activity converge to enhance memory fidelity. The final talk uncovers the critical role of a cognitive-motor basal ganglia interface in locomotion control in Parkinson's disease. Through these diverse yet interconnected studies, the symposium demonstrates the unique contributions of human single-neuron recordings to our understanding of the brain's capability to process complex cognitive tasks in language, memory and movement control, and advances our fundamental knowledge of the neural underpinnings underlying human cognition.

Dijksterhuis D. Pronouns activate concept cells in the human hippocampus | 13:00

Liebe S. Theta-based spike-phase coding supports temporal-order working memory in the human MTL and recurrent neural networks | 13:20

Daume J. Control of working memory by phase-amplitude coupling of human hippocampal neurons | 13:40

Gulberti A. Neuronal signals from deep brain areas related to the freezing of gait phenomenon in Parkinson's disease | 14:00

S09 - The focused mind: neural signatures of selective attention in perception and memory

Donnerstag 09:00 - 10:30 | Ort TODO

Session chair(s): Melinda Sabo

University of Lübeck

Selective attention plays a crucial role in shaping both perception and memory. Here, we present recent studies that investigate this role at the levels of perception, working memory and long-term memory using different neuroimaging approaches. Thereby, we aim to characterize selective attention and its neural signatures at different stages of information processing, and how they relate to goal-directed behavior. In the first talk, Sarah Tune will provide evidence for the neural implementation of auditory attention via neural speech tracking and its functional relevance to attentive listening behavior in a longitudinal cohort of aging individuals. Next, Niko Busch will discuss whether alpha power lateralization (10 Hz) plays a causal role in attentional orienting in the context of perception and working memory. The following two talks will address the topic of distraction during working memory storage. First, Philipp Deutsch will show how unattended and attended distractors interfere with neural representations of auditory content held in working memory captured via decoding of fMRI signals. Subsequently, Daniel Schneider will demonstrate how oscillatory EEG correlates of selective attention can be used to investigate the resumption of a working memory task after an interruption. Finally, based on EEG findings, Melinda Sabo will discuss whether the principles of attentional selection obtained in the perceptual and working memory domain can be transferred to long-term memory. This presentation will conclude the symposium by examining the similarities and differences in selective attention for various instances of goal-directed information processing.

Tune S. Can neural attentional filters predict listening behaviour dynamics in healthy aging? | 09:00

Busch N. The role of lateralized alpha oscillations in visual exogenous attention and short-term memory | 09:15

Deutsch P. Distraction Disrupts Working Memory Decoding in Auditory Cortex | 09:30

Schneider D. Interrupting working memory: A self-paced resumption phase facilitates primary task performance following an interruption | 09:45

Sabo M. The spotlight of memory: attentional selection of internal long-term memory representations | 10:00

S10 - Towards the Study of Interacting Emotional and Cognitive Processes and Their Neurophysiological Basis

Donnerstag 13:00 - 14:30 | Ort TODO

Session chair(s): Katharina Lingelbach

Department of Psychology, Bielefeld University,

In the past, cognitive and emotional processes were often investigated separately, ignoring their interdependence in human nature. However, there has been a recent shift towards studying how these processes interact. Nevertheless, the underlying neurophysiological basis and mechanisms remain unclear. The symposium aims to integrate new insights from various approaches and paradigms. It will be organised around three research questions. How and in what circumstances do cognitive states, like attention or load, modulate emotional processing (R1)? How do emotional stimuli affect cognitive processes, such as memory, attention or executive functioning (R2)? Utilizing intracranial recordings of the amygdala and parallel scalp recordings, Enya Weidner shows how attention to valence tunes emotion processing in the face processing network and amygdala and how this interaction changes over time. Katharina Lingelbach presents spatiotemporal and oscillatory signatures of simultaneous and sustained dual-task interactions of emotional face processing and working memory load. Anya Dietrich introduces temporal and frequency-specific signatures of emotional interference inhibition and emotion-cognition integration. How does the brain regulate emotional processing or alter the meaning of emotional stimuli (R3)? Christoph Scheffel discusses the role of cognitive effort in emotion regulation. Effects of effort and emotion regulation in different task phases and post-regulatory effects will be addressed on a subjective and physiological level. Maren Bertheau talks about error potentials and their link to emotion regulation when monitoring moral decisions made by autonomous cars in a dilemma situation. We close the symposium with an open discussion on the implications, challenges, and future directions of the research.

Weidner E. How Attention to Valence tunes Widespread Emotion Processing: Insights from Intracranial EEG and Scalp Recordings | 13:00

Lingelbach K. Spatiotemporal and Oscillatory Signatures of Emotional Face Processing and Working Memory Load in a Dual-Task | 13:15

Dietrich A. Understanding the Neural Mechanisms of Emotion-Cognition Interaction in Space, Time, Frequency, And Information Transfer | 13:30

Scheffel C. The Role of Cognitive Effort in Emotion Regulation | 13:45

Bertheau M. The Moral Machine in the EEG Lab | 14:00

Symposia session 3

S11 - Bridging the gap: a translational perspective on memory related sleep oscillations across species.

Donnerstag 16:30 - 18:00 | Ort TODO

Session chair(s): Fabian Schwimmbeck, Niels Niethard

University of Tübingen

Sleep is thought to support memory consolidation, with particular sleep oscillations, such as cortical slow oscillations, thalamic spindles and hippocampal sharp-wave ripples, facilitating interregional communication and plasticity. Animal electrophysiology has traditionally spearheaded work on the neural scaffolding of memory consolidation. However, rare invasive recordings in humans now facilitate translating and extending these findings across species. Following a translational perspective, this symposium will present the latest findings on ripples and sleep oscillations from animal and human research to provide a forum for cross-species discussion. The first two talks will focus on sleep oscillations in rodents. Niels Niethard (University of Tübingen) will talk about the role of sleep oscillations in mediating network dynamics within local hippocampal and cortical circuits during SWS and subsequent REM sleep. Jacqueline van der Meij (Radboud University Nijmegen) will present behavioural and electrophysiological results of a newly developed task to study the development of cognitive maps in rats. In a translational approach, Frank van Schalkwijk (University of Tübingen) demonstrates a functional division between archicortical ripples promoting hippocampal-neocortical communication and neocortical ripples facilitating local cortical processes in both humans and rodents. Finally, Fabian Schwimmbeck (University of Munich) will provide evidence for a ripple-triggered hippocampal-neocortical information flow by leveraging single-neuron recordings along the hippocampal output network during human sleep. Together, this symposium showcases how sleep oscillations shape neural dynamics in rodents and humans, fostering discussions on converging evidence for their pivotal role in memory consolidation across species."

Niethard N. Sleep oscillations and synaptic plasticity: A circuit perspective | 16:30

Samanta A. Influence of Cannabidiol on sleep and memory consolidation | 16:50

Schalkwijk F. An evolutionary conserved division-of-labor between archicortical and neocortical ripples organizes information transfer during sleep | 17:10

Schwimmbeck F. Single-neuron activity in the human MTL shows directed hippocampal-neocortical information flow during sharp-wave ripples during sleep | 17:30

S12 - Uncovering lifespan signatures: A multimodal perspective at the interface of development, aging, and disease risk

Donnerstag 16:30 - 18:00 | Ort TODO

Session chair(s): Christina Stier

nan

The emergence of various disorders often coincides with specific age windows, indicating alterations in developmental or aging pathways. Efforts to quantify biological aging and establish normative modeling using brain imaging have gained considerable momentum, mainly driven by big-data initiatives and MRI methods. This symposium aims to demonstrate the utility of such approaches and integrate evidence from functional modalities for a comprehensive understanding of the human lifespan. Dominik Kraft (University of Tübingen) will focus on the variability of brain-puberty interactions and the problem of high-dimensional data and embedding. Then, Philippe Jawinski (Humboldt University Berlin) will present results from the largest genome-wide association study of structural brain age gaps to date, linking accelerated or decelerated aging to mental and physical health. Similar prediction analyses and age-related studies utilizing M/EEG have often been limited by methodological constraints in the past, resulting in rare or inconsistent findings. Christina Stier (University Hospital Münster) will address this gap by discussing conventional and novel markers of neural dynamics that are informative of individual age across adulthood. Related to this, Elena Cesnaite (University of Münster) will then elaborate on brain-cognition relationships in old age using a large EEG repository, focusing on (non-) rhythmic activity. Deniz Kumral (University of Freiburg) will close the circle by discussing the contributions of age-related signal variability obtained with fMRI and EEG and the interplay with the brain's structural architecture. Overall, a panel of emerging experts will provide multimodal perspectives on the lifespan, incorporating machine learning and imaging, genetics, cognition, and structure-function relationships.

n n. Investigating brain development through the lenses of pubertal maturation | 16:30

Jawinski P. Genome-wide analysis of brain age identifies 25 associated loci and unveils relationships with mental and physical health | 16:45

Stier C. Time-series phenotyping across the adult lifespan: age prediction using MEG and massive feature extraction | 17:00

Cesnaite E. Alterations in rhythmic and non-rhythmic resting-state EEG activity and their link to cognition in older age | 17:15

Kumral D. Linking structural and functional changes during aging | 17:30

S13 - Exploring emotional dynamics: Physiological and subjective insights from clinical and experimental perspectives

Donnerstag 16:30 - 18:00 | Ort TODO

Session chair(s): Janine Wirkner, Maike Hollandt

University of Greifswald

In this symposium, we explore research on threat reactivity, fear extinction, and emotion regulation, providing valuable insights from both clinical and experimental perspectives to enhance our understanding of the complex biopsychosocial factors associated with mental disorders. The first contribution investigates threat reactivity in patients with primary anxiety or depressive disorders within the Research Domain Criteria (RDoC) framework. It highlights diverse threat reactivity patterns associated with clinical characteristics, emphasizing the necessity of comprehensive assessments in clinical settings. Utilizing an event-related approach, the second study explores fear extinction in patients with anxiety disorders compared to healthy controls. It suggests increased uncertainty among patients during extinction training, shedding light on potential mechanisms underlying fear extinction deficits. The third study investigates extinction generalization in exposure-based treatments, employing mental imagery to promote the updating of extinction memory. This approach shows promise in enhancing extinction for specific stimuli, offering new avenues for treatment development. Building on the defense cascade model, the fourth study examines autonomic defensive responses to social threat. It identifies similar dynamics in response to approaching social threat, while also uncovering specific response patterns not previously observed in research. In the final contribution, a novel paradigm combining emotional conflict paradigms with multimodal measurements is presented. This innovative approach underscores the potential for advancing our understanding of emotional regulation processes. Together, these studies contribute to a deeper comprehension of the mechanisms underlying mental disorders, offering insights that may inform both clinical practice and future research.

Hollandt M. Individual differences in threat reactivity among patients with anxiety and depressive disorders based on the RDoC framework | 16:30

Droste K. Exploring the multimodal dynamics of threat expectancy change during fear extinction: Insights from a novel event-related approach | 16:45

Scheuermann D. Enhancing extinction generalization in a category-based fear conditioning paradigm | 17:00

Szeska C. Dynamic organization of autonomic defensive responses to social threat | 17

Yang Y. Multimodal measurement of Affective Expressive Flexibility (AEF) – Evaluation of a new experimental paradigm | 17:30

S14 - Double the trouble, twice the fun: interactions between multiple mental representations across the cortical sheet.

Donnerstag 13:00 - 14:30 | Ort TODO

Session chair(s): Thomas Christophel

nan

As we navigate daily life, our senses are subject to a merciless onslaught of incoming stimulation only a tiny subset of which is relevant for future behavior. Working memory enables us to retain these relevant inputs for subsequent use. But our cortical representational resources are limited and consequently we are tasked with encoding, updating, selecting, removing, and refreshing the right information using these resources. Work focusing on individual mental representations and their cortical instantiation has revealed that both anterior and posterior regions can represent working memory contents. Here, using data from humans and nonhuman primates, we investigate the interactions between multiple mental and neural representations using multivariate pattern analysis. Rosanne Rademaker will show how incoming sensory information interacts with items held in working memory, and what happens when visual input becomes task relevant. Thomas Christophel will demonstrate how load effects in delayed recall can be explained by altered recruitment of cortical regions as the number of retained items increases. Polina Iamshchinina will talk about how attending to a sensory input and selecting a mental representation from working memory relies on a shared mechanism. Surya Gayet will interrogate bidirectional interactions between memory representations and perception during naturalistic search. Finally, Christoph Blewdowski will demonstrate that even item from previous trials that are inadvertently represented can alter currently relevant mental representations and behavior. Thereby we shed light on the manifold of interactions between concurrently represented mental representations and how they jointly guide our interactions with the world around us.

Rademaker R. Manipulating attentional priority creates a trade-off between memory and sensory representations in human visual cortex | 13:00

Christophel T. Independent representational roles for sensory and anterior regions under working memory load | 13:15

Iamshchinina P. Neural ensembles within prefrontal cortex generalize across attention and working memory | 13:30

Gayet S. Bidirectional interactions between memory representations and perception during naturalistic search | 13:45

n n. A direct neural signature of serial dependence in working memory | 14:00

S15 - Psychobiology of Treatment Expectation

Donnerstag 16:30 - 18:00 | Ort TODO

Session chair(s): Lieven Schenk, Stefanie Brassen

University Medical Center Hamburg-Eppendorf

This symposium will delve into latest advances in research on individuals' treatment expectations as important modulators of health outcomes. Understanding the psychobiological mechanisms of this influence has the potential to capitalize on these effects, optimizing treatment strategies and improving health outcomes. Early career researchers from the Collaborative Research Center "Treatment Expectation" (CRC 289) will provide novel neurobehavioral insights into the effects of positive (placebo) and negative (nocebo) expectations on pain and the affective system. The presented studies used controlled induction protocols and a rich variety of methods, including neuroimaging, psychophysiology, behavioural measurements, and machine learning approaches. First, Lieven Schenk will present data on the amplification of treatment expectations and placebo analgesia through negative side effects, indicating a strong involvement of the descending pain modulatory system. Second, Jana Aulenkamp will address the differences in expectation effects on visceral and somatic pain perception, emphasizing the role of negative instruction and experience. Next, Christoph Wittkamp will present the influence of positive and negative expectations on pain perception using EEG-fMRI, highlighting distinct neural representations during pain processing. Afterwards, Daniela Marrero Polegre will demonstrate how positive expectations can improve mood and emotional processing in older individuals, with a special focus on prefrontal-limbic regulation. Finally, Raviteja Kotikalapudi will utilize machine learning approaches on large neuroimaging datasets to predict individual differences in treatment expectations, underlining the potential for personalized medicine and clinical interventions. This symposium aims to promote interdisciplinary discussions about the principles and potential benefits of expectations in health and disease.

Schenk L. How side effects can improve treatment efficacy | 16:30

Aulenkamp J. Nocebo modulation of pain perception across pain modalities | 16:45

Wittkamp C. The neural dynamics of pain-related expectation generation: A combined EEG-fMRI study | 17:00

Polegre D. Expectation effects on emotional processing in late life | 17:15

Kotikalapudi R. Exploring the neurobiological signatures of treatment expectation | 17:30

Poster session 1

Development and Ageing

Disorders and Interventions

(Brain) Stimulation

Affective Neuroscience

Open, Reproducable and Meta Science

Keynote

Human auditory communication – from visual face areas to sensory thalamus

Katharina von Kriegstein

Technische Universität Dresden

Friday 11:00 - 12:00 | ORT

Understanding what is said and recognising the identity of the speaker are two important tasks that the human brain is faced with in auditory communication. For a long time, neuroscientific models of auditory communication have focused mostly on auditory language and voice-sensitive cerebral cortex regions to explain speech and voice identity recognition. However, we now know that the brain uses even more complex processing strategies for recognising auditory communication signals, such as the recruitment of dedicated visual face areas, as well as subcortical sensory thalamus structures. In the first part of my talk, I will present a short overview on our neuroscientific findings how visual face areas help processing auditory communication signals. I will also show studies that translate the neuroscience findings to computational models. In the second part, I will focus on the contribution of subcortical sensory thalamus structures to speech recognition. I will review 7-Tesla neuroimaging findings from typically developed participants as well as developmental dyslexics that suggest a major role of the sensory thalami in speech recognition.

Symposia session 4

S16 - Multidisciplinary and multimodal perspectives on episodic memory in neuropsychiatric disorders

Freitag 09:00 - 10:30 | Ort TODO

Session chair(s): Jessica Peter, Michael Orth

University of Luebeck

The ability to form and retrieve memories about personal experiences is paramount for human existence. The quantity and quality of such memories depend on numerous factors to do with the experiences themselves but also with the complexities of the neuroanatomical basis of memory formation and retrieval. Much insight can be gained from deficits in this ability in the context of neuropsychiatric disorders. In this symposium, we will explore the topic of episodic memory formation and retrieval from different perspectives. We will look at the impact of ageing, degeneration, or surgical lesions on the hippocampus as a key hub in networks subserving episodic memory. We will then examine the influence mood states can have on formation and retrieval of emotionally-valenced memories and, vice-versa, how mood states may self-perpetuate because of what is being remembered. This symposium will provide a neuroscience perspective on factors that influence episodic memory performance and its underlying neuroanatomy across the lifespan and in the context of neuropsychiatric conditions such as Alzheimer's disease, Depression, Trauma, and Epilepsy. There will be five talks, each presenting cutting-edge research combining behavioural data with physiology or neuroimaging in different age groups or psychiatric conditions. We will discuss implications and possible directions for our understanding of episodic memory and future theoretical and experimental approaches that could be useful to fill the many remaining knowledge gaps.

Bunzeck N. Trajectories and contributing factors of neural compensation in healthy and pathological ageing | 09:00

Reber T. Single neuronal mechanism of transitive inference: insights from invasive recordings in the human medial temporal lobe of epilepsy patients | 09:15

Staniloiu A. Dissociative Amnesia – A survey of 95 cases | 09:30

Kobelt M. Exploring neural representations during trauma-analog experiences and memory intrusions | 09:45

Orth M. Left DLPFC modulation induces cognitive reorganisation in patients with depression | 10:00

S17 - Exploring the Layers of Language Prediction: From Phonemes to Paragraphs

Freitag 09:00 - 10:30 | Ort TODO

Session chair(s): Merle Schuckart, Sandra Martin

Ernst Strüngmann Institut

Language prediction plays a pivotal role in understanding and facilitating everyday communication. It operates on multiple levels and time scales, enabling us to anticipate everything from phonemes and syllables to words, meanings, and syntactic structures. Each granularity level contributes uniquely to our ability to comprehend language, making communication more seamless. This symposium illustrates the breadth of the methodological intricacies of language prediction research and how predictability shapes language comprehension and production across different time scales. Firstly, Peter Donhauser presents two MEG studies on prediction during natural listening at the phonemic time-scale, highlighting predictions at the most granular levels. Jill Kries then shows how the neural dynamics of phoneme representation interact with lexical predictability, in healthy participants and individuals with aphasia. Moreover, she will also present her ongoing intracranial EEG work on the decoding of speech features such as word predictability, during speech comprehension and production. Following this, Merle Schuckart shares findings from a behavioral self-paced reading experiment, illustrating the influence of increased cognitive load on language prediction across several time scales, and how this relationship is modulated by cognitive aging. Lastly, Cas Coopmans discusses the role of syntactic structure building in natural language comprehension. Using MEG data, he provides novel evidence for predictive structure building during story listening. We envisage a controversial and fruitful discussion of conceptual and methodological links between these approaches. How might these diverse perspectives on language prediction reshape our understanding of communication? Join us in exploring these innovative studies.

Donhauser P. Neurophysiology of speech predictions at the sublexical level | 09:00

Kries J. How lexical predictability affects neural dynamics of phoneme representations in neurotypicals and individuals with aphasia | 09:20

Schuckart M. Contribution of cognitive control resources to natural language comprehension across the adult lifespan | 09:40

Coopmans C. Predicting syntactic structures during naturalistic language comprehension | 10:00

S18 - The versatile role of the endocannabinoid system in clinical research

Freitag 09:00 - 10:30 | Ort TODO

Session chair(s): Daniela M. Pfabigan, Sara L. Kroll

University of Bergen

Recent years have seen an emergent interest in research of the endocannabinoid system (ECS). Endocannabinoid signalling plays a significant role in promoting stress buffering and reward-related behaviour. However, how endocannabinoids contribute to the presentation of clinical conditions, or how this system may be leveraged for novel therapeutics, is poorly understood. Therefore, this panel will highlight clinical research on the novel role of the ECS in psychiatric and non-psychiatric disorders. This symposium will provide an overview of ongoing research that takes advantage of improved assessment methods and underlying knowledge concerning the ECS. Sara L. Kroll (University of Zurich) will start with an introduction to the ECS. Daniela M. Pfabigan (University of Bergen) will present a clinical trial design investigating changes in social experiences in individuals undergoing weight-loss surgery. This trial will link social experiences and well-being to hair concentrations of endocannabinoids as biological marker of well-being. Sara L. Kroll will show findings of an altered ECS in individuals with non-medical prescription opioid use (NMPOU) and discuss drug-related differences of peripheral endocannabinoids. Vinzenz K. Schmid (University of Zurich) will present recent findings of an altered endocannabinoid response to the psychosocial stressor of social exclusion within the same NMPOU population compared to controls. The symposium will be concluded by Marc D. Ferger (University of Cologne) talking about how non-suicidal self-injurious behaviours and childhood-trauma are reflected in endocannabinoid concentrations in a large female adolescent sample. He will discuss the potential of using the ECS as a novel therapeutic target for psychiatric disorders

Pfabigan D. Does bariatric surgery have a positive effect on patients' social experiences and is this associated with the endocannabinoid system? – Study design of the BaSES study | 09:00

Kroll S. Peripheral endocannabinoids and their link to social stress in individuals with chronic non-medical prescription opioid use | 09:20

Schmid V. The Role of the Endocannabinoid System in Social Stress Reactivity among Non-medical Prescription Opioid Users: A Cyberball Paradigm Study | 09:40

Ferger M. The endocannabinoid system in adolescents with non-suicidal self-injurious behavior and childhood trauma- new findings and promising therapeutic targets | 10:00

S19 - Models of Mismatch Responses - Moderators and Underlying Mechanisms

Freitag 16:30 - 18:00 | Ort TODO

Session chair(s): Insa Schlossmacher

University of Münster

Perceiving unexpected events is an important function of human perception and of utmost importance for survival. In an experimental setting, a mismatch between expected input and presented stimulus is often accompanied by an increase in processing and/or brain activation (= mismatch response). In the current symposium, results of new studies investigating such mismatch responses in audition, vision and somatosensation will be presented. The talks will cover a wide area of applied methods like electroencephalography (EEG) and functional magnetic resonance imaging (fMRI) as well as behavioral measures. In the first talk, Jana Harenbrock will focus on how auditory mismatch responses measured with EEG are moderated by awareness and task relevance. In the second talk, Nina Coy will shed light on how the predictive potential of auditory deviants influences mismatch responses like mismatch negativity, P3a and behavioral measures. In the third talk, Insa Schlossmacher will address underlying mechanisms of visual mismatch responses measured by EEG as well as fMRI. In the fourth talk, Miro Grundei will examine mismatch responses across vision, audition and somatosensation using computational modeling and connectivity analysis of EEG and fMRI data. In the last talk, Kaja Loock will take up the topic of predictive processing by investigating how prediction errors elicited in a fear-conditioning paradigm influence episodic memory formation. Taken together this symposium will present new and impactful findings elucidating moderators and underlying mechanisms of mismatch responses.

Harenbrock J. Differential auditory mismatch responses depending on awareness and task relevance | 16:30

Coy N. Is the oddball just an odd-one-out? A new perspective on the predictive potential of deviations from structured auditory regularities. | 16:45

Schlossmacher I. Underlying mechanisms of visual mismatch responses – an EEG-fMRI study | 17:00

Grundei M. Modeling mismatch responses across the senses | 17:15

Loock K. The specifity of aversive prediction error-related memory enhancement | 17:30

S20 - The German National Cohort (NAKO) as a resource for mental health research

Freitag 09:00 - 10:30 | Ort TODO

Session chair(s): Maja P. Völker, Fabian Streit

Department of Genetic Epidemiology in Psychiatry, Central Institute of Mental Health, Medical Faculty Mannheim, Heidelberg University; Department for Psychiatry and Psychotherapy, Central Institute of Mental Health, Medical Faculty Mannheim, Heidelberg University; Hector Institute for Artificial Intelligence in Psychiatry, Central Institute of Mental Health, Medical Faculty Mannheim, Heidelberg University

The German National Cohort (NAKO) is a population-based prospective cohort study that investigates common diseases and their risk and protective factors. It is the largest German health study with 205,415 subjects aged 19-74 years recruited in 18 study centres. The symposium targets researchers who might benefit from working with NAKO data, and showcases its potential to investigate mental health, risk factors, and neural correlates. The first presentation provides an overview of the NAKO with a focus on psychiatric phenotypes. It will present the assessment strategy and show how researchers can access the data. Moreover, an overview of the instruments to assess mental health and related constructs, and of observed prevalences and associations with established risk factors is given. The second presentation shows how this dataset can be used to investigate risk factors for mental health. Findings on individual and joint effects of family history and childhood trauma on depression are be presented. The third presentation gives an overview of the brain imaging performed in a subset of 30,868 individuals and introduces preliminary findings regarding associations of neuroimaging metrics with socio-demographic variables and cognitive domains, as well as the application of data in a deep learning-based brain-age model. The fourth presentation shows how structural brain imaging data can be combined with psychosocial factors to predict measures of anxiety and panic disorder. The applied machine learning algorithms showed good classification performance, the predictive power of psychosocial factors and highlighted the left amygdala as a relevant brain region.

Streit F. An introduction to the German National Cohort (NAKO) with a focus on psychiatric phenotypes | 09:00

Völker M. Individual and Joint Effects of Family History of Depression and Childhood Trauma on Current and Lifetime Depression | 09:20

Jockwitz C. Overview of the (brain) MRI assessment in the NAKO | 09:40

Gutzeit J. Classification of anxiety and panic using structural MRI data and psychosocial factors: machine learning results from the NAKO study | 10:00

Symposia session 5

S21 - Unravelling Visual Prediction: Insights from Electrophysiology, EEG, fMRI, and Computational Modelling

Freitag - 12:30 | Ort TODO

Session chair(s): Helen Blank

Neural Circuits and Cognition Lab, European Neuroscience Institute Göttingen Perception and Plasticity Group, German Primate Center

The central role of predictions in visual perception prompts ongoing debates regarding how priors influence sensory processing, specifically whether, where, and when they increase or reduce representations of expected input. This symposium unifies researchers employing diverse methodologies, encompassing electrophysiology in the primate brain as well as fMRI, EEG, and computational modelling based on deep convolutional neural networks (DCNN) in humans, with the collective aim to understand how predictions shape visual processing. In the domain of hierarchical face recognition, Caspar Schwiedrzik will show that tuning properties in early regions of the macaque face-processing system reflect properties of higher areas, revealing the flexible transformation of representational spaces by predictive context. Correspondingly, Annika Garlichs employs multivariate fMRI analyses with DCNNs to demonstrate prediction-dependent error processing throughout, as well as heightened representations at early stages of the face-processing hierarchy in humans. In the domain of image processing, Lea-Maria Schmitt presents a series of behavioural and fMRI studies with laminar precision probing the recurrent dynamics underlying the perception of novel but not familiar images. Arjen Alink presents EEG evidence that initially predictions facilitate processing of expected visual information in natural images while later enhancing the processing of unexpected input, thereby suggesting that priors and input are differentially integrated over time. Finally, Wanlu Fu combines a DNN model with EEG recordings to show that readers optimize visual information using predictive coding principles by focusing on the orthographic prediction error. Overall, the symposium will provide computational insights into how predictions influence neural representations across visual processing hierarchies.

Schwiedrzik C. Linking pattern separation to predictive processing in high-level visual cortex | 11:00

Garlichs A. Computational Modelling Reveals Prediction Error and Sharpened Representations Across the Face-Processing Hierarchy | 11:15

Alink A. Stimulus-evoked EEG response patterns more strongly encode expected and unexpected image components consecutively | 11:30

Schmitt L. What recurrent dynamics underlie the perception of familiar and novel images? | 11:45

Fu W. Specifying the orthographic prediction error for a better understanding of efficient visual word recognition in humans and machines | 12:00

S22 - Uncovering lifespan signatures: A multimodal perspective at the interface of development, aging, and disease risk

Freitag - 12:30 | Ort TODO

Session chair(s): Christina Artemenko

TU Dresden

In our modern aging society, individuals must function in their daily life well into old age. Cognitive deficits during aging might therefore have a detrimental impact on the ability to live independently. Hence, it is essential to better understand how cognitive processes change during aging. This symposium addresses this question in the domains of perception, memory, and numerical cognition. Thus, age-related effects will be discussed regarding multisensory plausibility, visual distractibility, episodic and working memory, as well as number processing and arithmetic. The employed tasks cover the whole range from basic to complex cognitive performance tests. In addition to behavioral methods, functional (fNIRS) and structural (MRI) neuroimaging techniques were used to identify the underlying neural mechanisms subserving cognitive functions. Methodologically, study designs consisted of cross-sectional studies (comparison of older and younger adults), longitudinal studies (developmental changes during aging), intervention studies (pre-post-design with a control group), and patient studies (neurogenerative disease with or without cognitive impairment and a healthy control group). This methodological variety reflects the chances and challenges in the research field on cognitive aging. The findings reveal age-related deficits in subjective perception and objective performance, but also age-related modulation and compensation mechanisms that support the preservation of cognitive functions during aging.

Li S. Aging and digitalized perceptual augmentation: Lessons learned from cortical processes of multisensory plausibility in virtual environments | 11:00

Klink H. The degree of subjective cognitive complaints is related to increased distractibility but also increased improvement in visual processing speed after physical exercise | 11:15

Dahl M. The integrity of dopaminergic and noradrenergic brain regions is associated with different aspects of late-life memory performance | 11:30

Artemenko C. Age-related changes in arithmetic in the fronto-parietal network | 11:45

Loenneker H. Basic numerical cognition, arithmetic, and activities of daily living in Parkinson's Disease | 12:00

S23 - The Brain on Gonadal Hormones: Uncovering the Interplay between Affect and Brain Dynamics

Freitag - 12:30 | Ort TODO

Session chair(s): Anna Denninger

Biological and Clinical Psychology, University of Trier and Institute for Cognitive and Affective Neuroscience

Gonadal hormones, integral to the reproductive system in both sexes, appear to play a critical role in our everyday life regulating various physiological and psychological responses within the body and influencing our affective system including the stress response, emotion regulation, reward processing and mood. As the brain represents a gateway for endocrine effects, their influence further extends to brain structure and functioning. Any alterations in the hormone levels may lead to health challenges. Women, especially, experience hormonal fluctuation throughout their lifespan that impact brain function and plasticity, affect regulation, and mental well-being. Thus, changes in hormonal status (e.g., menstrual cycle fluctuations, use of hormonal contraceptives, and menopause) have been linked to mental health and brain architecture changes in different groups of women. Our symposium focuses on current state-of-the-art research on the interplay between gonadal hormones, affect and brain functioning. Gregor Domes (Trier) discusses a meta-analysis on stress reactivity's link to gonadal hormones. Followed up by Anna Denninger (Tübingen) exploring the impact of experimentally elevated estrogen on brain volume and emotion regulation in women. Tobias Sommer (Hamburg) then presents data on brain function, reward processing, and reinforcement learning in both sexes. Next, Ann-Christin Kimmig (Tübingen) analyzes inter-subject representational similarity in women discontinuing or starting oral contraception, examining hormone concentration variability, resting-state functional connectivity, and depression. Arielle Crestol (Oslo) investigates the link between proxies of cellular and brain aging with menopause-related factors, depression, and APOE $\epsilon 4$ genotype. Overall, this symposium will explore the complex interplay between gonadal hormones, affect, and brain dynamics.

Domes G. The acute effects of psychosocial stress on gonadal steroid secretion in humans – a meta analysis | 11:00

Denninger A. Effects of estradiol and emotion regulation on grey matter volume | 11:15

Sommer T. Influence of estrogen on dopamine-related brain activity | 11:30

A-C.S. K. Navigating Mood: Understanding Oral Contraceptives' Influence on Mental Well-Being | 11:45

Crestol A. Proxies of biological aging are associated with menopause, depression, and genetic risk for Alzheimer's disease in females | 12:00

S24 - Sensory, cognitive, and metabolic drivers of eating behavior

Freitag - 12:30 | Ort TODO

Session chair(s): Kathrin Ohla

dsm-firmenich

Understanding the drivers of eating behavior is at the core of combating the global health challenges posed by obesity, malnutrition, and related disorders. Insight into the multifaceted factors influencing eating allows for the development of effective interventions. It is well-accepted that taste and smell play an intricate role in food perception and eating behavior through an interplay of sensory and cognitive processes. Neural encoding of taste and smell informs reward processing, and satiety signaling, and ultimately guides dietary preferences. Nevertheless, both senses are notoriously understudied. The first two presentations significantly contribute to understanding taste and smell perception and provide novel findings on how the brain codes taste and odor information that can be linked with behavior. Even less understood is the role of tight attire in modulating bodily awareness, or interoception, which can regulate food intake as it provides individuals with real-time information about their internal physiological states. The 3rd presentation investigates the influence of attire on mind-body connections and exposes how the wearing of shapewear affects body image and dietary preferences. Lastly, the role of the neurotransmitters in food intake will be explored. Dopamine and serotonin have been linked with reward and motivation and appetite, respectively. The last two presentations examine the time-of-day fluctuations of dopamine in the regulation of impulsivity and fat intake and how insulin sensitivity regulates central serotonin functions in humans, unveiling implications for risk decision-making and mood behaviors.

Ohla K. Taste Quality Decoding in Human EEG predicts Taste-Related Behavior | 11:00

Kehl M. Human Single Neuron Codes for Olfaction | 11:15

Cionca S. Dressing the Mind: Shapewear Influences Mind-Body Connection, Altering Body Awareness and Dietary Preferences | 11:30

Ryan L. Dopamine underpins time-of-day dependent variation of human impulsivity and fat intake | 11:45

Pu M. Insulin gates the serotonergic brain functions in humans | 12:00

S25 - Mnemonic processing of immersive environments: Neuronal findings on different memory systems from virtual reality studies

Freitag - 12:30 | Ort TODO

Session chair(s): Joanna Kisker

University of Stuttgart, Institute of Human Factors and Technology Management IAT, Applied Neurocognitive Systems

The majority of everyday memories is based on sensory-rich, three-dimensional experiences. For that reason, Virtual Reality (VR) is increasingly used to approximate realistic experiences. Yet little is known about how the neuronal correlates of memory derived from 2D-conditions translate to immersive conditions. Consequently, the symposium explores how different memory systems operate under VR-conditions, demonstrating both fundamental principles and practical applications. Anna Vorreuther presents a series of VR-fNIRS-studies examining the neuronal correlates of working memory load and associated learning progress. She demonstrates how brain-computer-interfaces can be utilized to develop and tailor immersive learning systems to individual needs and abilities. As Felix Klotzsche demonstrates, visual short-term memory is affected by the spatial relationship between stimulus and observer. By assessing the spatial constraints underlying two well-established electrophysiological markers of memory retention, he examines the effects of stimulus eccentricity. Likewise, spatial memory is facilitated by offering real-time 3D-content: Julia Belger presents an immersive Virtual Memory Task which allows for assessing, training and rehabilitating spatial memory deficits in neurologic patients, demonstrating the advantages of using VR in neuropsychological practice. To unravel the dependence of episodic memory retrieval on the encoding modality, Joanna Kisker compares the electrophysiological correlates of retrieval of VR-based and 2D-based engrams, and demonstrates the potential to refine these findings by examining the high-frequency domain. Concluding, Marike Johnsdorf presents a comprehensive investigation on how different degrees of reality affect object perception and mnemonic processing. Remarkably, she contrasts the neuronal correlates of a conventional laboratory, a realistic VR, and a real-life condition.

Vorreuther A. fNIRS-Based Decoding of Mental State in Virtual Reality | 11:00

Klotzsche F. Title: The influence of stimulus eccentricity on short-term memory-related EEG components in virtual reality setups | 11:15

Belger J. Neuropsychological Application of Immersive Virtual Reality for Enhanced Spatial Memory Assessment and Rehabilitation | 11:30

Kisker J. How immersive features affect memory: Contrasting the retrieval of Virtual Reality-based and PC-based engrams on the electrophysiological level. | 11:45

Johnsdorf M. Object Perception and Memory Processing in Laboratory, Realistic Virtual, and Real-Life Environments: A Comparative EEG Analysis | 12:00

Symposia session 6

S26 - Improving replicability in neuroscientific research (IGOR-Symposium)

Freitag 16:15 - 17:45 | Ort TODO

Session chair(s): Hilmar Zech

University of Bielefeld, University Medical Center Hamburg-Eppendorf

The topic of replicability has been widely discussed in neuroscientific research recently. Replicability challenges have been particularly highlighted for experimental tasks, which are crucial for bridging the gap between brain and behavior. Therefore, this symposium will focus on improving replicability in neuroscientific research, with a special emphasis on testing and enhancing the reliability of experimental tasks. Tina Lonsdorf will start off the symposium by providing a general introduction to the topic of replicability with a focus on neuroscientific research. She will introduce the multiverse approach as a potential solution to improve replicability and share a vision for a living database. Next, Sercan Kahveci will offer a detailed comparison of methods for determining the split-half reliability of experimental tasks while highlighting best practices and giving hands-on recommendations for neuroscience researchers. Building upon this talk, Hilmar Zech will demonstrate how test-retest reliability of smartphone-based experimental tasks can be improved by pooling longitudinal data, and how this can improve neuroscientific research by linking task outcomes to real-world behaviors. Advancing to fMRI research, Juliane Nagel will showcase, how large-scale online experiments can be instrumental in improving the reliability and, ultimately, the replicability of costly fMRI experiments. Finally, Nils Kroemer will underscore the importance of assessing individual-level reliability in task research to foster translational research that links task outcomes to neurological disorders. Together, this symposium will highlight the importance of replicability and provide researchers with insights into the toolkit necessary to promote reliable and replicable research in neuroscience.

Lonsdorf T. Navigating replicability in experimental behavioral neuroscience | 16:15

Kahveci S. Reliability of reaction time tasks: exploring the methods and pitfalls of its computation | 16:30

Zech H. Improving task reliability in experimental behavioral neuroscience | 16:45

Nagel J. Using online-studies to perform precise human neuroscience: how do rewards affect long-term memory? | 17:00

Kroemer N. How to design a good task: lessons from statistical and computational models of behavior and brain responses | 17:15

S27 - Down the habit hole: Where habitual and goal-directed control of behavior meet

Freitag 16:15 - 17:45 | Ort TODO

Session chair(s): Stephan Nebe, Lieneke K. Janssen

University of Zurich

Behavior is generally thought to rely on either habitual or goal-directed control. Despite its merits in the lab, this strict dichotomy is increasingly questioned, in particular for its use in understanding real-life habits in health and disorders. Together with current criticism of existing experimental "habit" paradigms, the need for more diverse experimental approaches becomes manifest. In this symposium we go down the rabbit hole of research on habitual and goal-directed control and discuss promising (variations of) experimental paradigms, innovative modeling strategies, and imaging approaches to pave the way forward. First, Stephan Nebe will introduce novel tasks, designed to capture value-free habit learning using computational modeling, as well as a test battery of established lab-based and self-report measures of habit, used for validation. Second, Eike Buabang will present EEG correlates of habitual and goal-directed control in a contingency reversal task to explore their interaction. Third, Matthäus Rudolph will show that contingency learning is the outcome of two independent processes, namely automatic retrieval of recent stimulus-response episodes and the application of rule-based knowledge. Fourth, Angela Brands will bridge the gap between lab and life by presenting model-based behavioral and fMRI results from a sequential decision-making task in gambling addiction, which is thought to be characterized by aberrant habitual responding in daily life. To conclude the session, Lieneke Janssen will lead a discussion on current limitations of habit research, challenges that follow a greater diversity in research approaches, not necessarily relying on dichotomous thinking, and impactful next steps in habit research.

Nebe S. A comprehensive study of experimental approaches to habit formation | 16:15

Buabang E. Characterizing neural correlates of habitual and goal-directed control | 16:35

Rudolph M. Dissociating the roles of automatic episodic retrieval and contingency awareness in contingency learning | 16:55

Brands A. Problematic gambling behavior impacts model-based reinforcement learning performance | 17:15

S28 - Central nervous biomarkers of stress and resilience in the lab and in everyday life: Predictions and considerations

Freitag 16:15 - 17:45 | Ort TODO

Session chair(s): Gina-Isabelle Henze, Lara M.C. Puhlmann

Research Division of Mind and Brain, Department of Psychiatry and Psychotherapy CCM, Charité Universitätsmedizin Berlin, Corporate Member of Freie Universität Berlin, Humboldt-Universität zu Berlin, and Berlin Institute of Health; Big Data Institute, Li Ka Shing Centre for Health Information and Discovery, Nuffield Department of Population Health, University of Oxford; Institute of Psychology, University of Regensburg;

Stress reactions are holistic phenomena characterized by psychological and physiological activation encompassing the brain and the endocrine system. Understanding how the brain reacts to acute and long-term stress is therefore central to biopsychological stress research. It promises to identify neural biomarkers to predict future psycho-physiological stress reactions. However, biopsychological stress measures often do not correspond empirically. Our symposium discusses novel approaches to study how neural activation and plasticity correspond with stress and resilience trajectories in the laboratory and everyday life. First, Gina-Isabelle Henze presents data from a mega-analysis including 500 subjects exposed to ScanSTRESS. For a subsample, it was further investigated if structure- and task-based brain measures can predict response trajectories of acute stress processing from baseline through acute to recovery phase. Next, Peter Kirsch speaks about effects of autonomy support and physical activity of pupils (fifth and sixth graders) on their neural and cortisol stress responses as well as on brain development in the context of an education outside the classroom intervention. Marina Giglberger reports on associations between acute neural stress responses and depression- and anxiety-symptoms as well as on the predictive value of these neural correlates for the course of depression- and anxiety-symptom measures in healthy subjects in daily life (over 13 months). Lara Puhlmann then discusses how psychological stress reactions as a proxy for mental resilience can be measured and predicted in cross-sectional as well as longitudinal studies. Finally, Meike Hettwer presents data on how longitudinal trajectories of resilience are related to progressive cortical myelination during adolescence.

Henze G. The brain under acute stress: Triple network reactions and prediction of psycho-endocrine response trajectories | 16:15

Kirsch P. Choice and movement matters: Pupils' stress regulation, brain development and brain function in an outdoor education project | 16:30

Giglberger M. The association between neural stress responses and symptoms of anxiety and depression | 16:45

L.M.C. P. Resilience quantification via psychological stressor reactivity scores | 17:00

Hettwer M. Longitudinal trajectories of resilient psychosocial functioning link to ongoing cortical myelination and functional reorganization during adolescence | 17:15

S29 - Neural correlates of conscious experience: progress and challenges

Freitag 16:15 - 17:45 | Ort TODO

Session chair(s): Torge Dellert

University of Münster

How does our brain generate consciousness, that is, our subjective experience of what it is like to see or feel? Recent years have seen remarkable progress in the search for its neural correlates. However, central aspects of their spatiotemporal dynamics are still hotly debated. The aim of this symposium is to showcase how rigorous behavioral and neuroscientific experiments can critically test competing theoretical predictions in the neuroscience of consciousness. While each talk will address a specific debate, a common focus will be on dissociating neural correlates of conscious experience from those of post-perceptual processes. Torge Dellert (University of Münster) will highlight the importance of isolating neural correlates of consciousness from those of decision-making and show that they are graded rather than dichotomous. Darinka Trübutschek (MPIEA Frankfurt) will then challenge widely held assumptions about the role of memory for conscious perception based on behavioral, eye-tracking and MEG data. The next two talks will address previously neglected sustained rather than transient visual experiences. Antje Peters (University of Münster) will present EEG and fMRI studies, while Alex Lepauvre (MPIEA Frankfurt) will showcase intracranial and behavioral data from the Cogitate consortium and psychophysical experiments. Finally, Jona Förster (FU Berlin) will highlight neural correlates of conscious experiences in a previously understudied sensory modality: somatosensation. Together, these presentations will demonstrate how carefully designed experiments can shed light on the neural basis of an inherently subjective phenomenon. We will finish the symposium with an open discussion of advances, challenges and future directions in the neuroscience of consciousness.

Dellert T. Electrophysiological correlates of gradual awareness in the absence of decision-making | 16:15

Trübutschek D. Challenging current theories of conscious perception? - The case of activity-silent, non-conscious 'working' memory | 16:30

Peters A. Neural correlates of sustained conscious visual perception | 16:45

Lepauvre A. Temporal dynamics of visual conscious experience | 17:00

Förster J. EEG correlates of conscious somatosensory perception in a tactile temporal discrimination task | 17:15

S30 - Cognitive Schemas and Memory Generalization

Freitag 16:15 - 17:45 | Ort TODO

Session chair(s): Mona Garvert, Monika Schönauer

University of Freiburg

To navigate a complex world successfully, we need to gather knowledge about the rules that govern it. By abstracting general knowledge from the experiences we make, we form flexible schemas that allow us to predict future outcomes and react appropriately. Drawing on multimodal brain imaging data and behavioral evidence, this symposium presents new evidence on how schemas guide human behavior and allow us to generalize to new experiences. The first two talks will focus on how cognitive schemas shape behavioral choices: Katja Kleespies will show that prior knowledge influences what we remember from everyday-like experiences, like visiting a supermarket or going to a restaurant, and that schema-related brain activity guides memory encoding and retrieval. Charley Wu will then demonstrate that we use complex compositional strategies to navigate such contexts, drawing on fragments of existing schemas to solve novel tasks, even under time pressure. The following speakers will shed light on how regularities are inferred from new experiences: Nico Schuck will show that both the hippocampus and the orbitofrontal cortex are involved in generalizing event structures across different environments. Felix Deilmann will present evidence that the hippocampus and prefrontal cortex represent distinct types of relational information, predictive contingencies between objects and the associated reward structure, and how we can generalize contingencies between these dimensions. Finally, Philipp Paulus will talk about how sleep aids the abstraction of rule-based contingencies in a category learning task, demonstrating that our brains continue to process information even after exploration has ended.

Kleespies K. Structuring the world: Naturalistic event schemas guide recall behavior and induce content-specific oscillatory activity | 16:15

Wu C. From Fragments to Schemas: Compositional Navigation Under Time Pressure | 16:30

Schuck N. Hippocampus and OFC map experiences on abstract state representations to help us learn generalisable policies | 16:45

Deilmann F. Distinct hippocampal and prefrontal representations of structure and reward contingencies for generalization and inference | 17:00

Paulus P. Sleep aids rule-based inference in a category learning task | 17:15

Poster session 2

Saturday | 01. June 2024

Keynote

Body-brain interactions in the control of motivation

Nils B. Kroemer

Universität Bonn, Universität Tübingen

Saturday 12:00 - 13:00 | ORT

To ensure survival, optimal reward-seeking requires adaptation to internal and external states, and it is thought that our actions operate on a deeply engrained metabolic budget. Although goal-directed behavior has often been linked to prefrontal circuits, emerging evidence suggests a pivotal role of ascending signals from the body in tuning reward-related behavior according to bodily demands. In this talk, I will review the growing support for bodily signals as key modulators of instrumental behavior and the neural pathways subserving adaptation. First, I will summarize the motivational effects of interventions targeting ascending bodily signals, such as non-invasive transcutaneous vagus nerve stimulation (tVNS). Second, I will discuss the potential mechanistic role of bodily signals, such as gastric myoelectric frequency that regulates the speed of the digestive tract, in the control of motivation. Third, I will evaluate the implications of a focus on body-brain interactions for an improved understanding of the etiology and treatment of frequent mental disorders using major depressive disorder as an example. Fourth, I will highlight remaining challenges and open questions to unlock the potential of novel techniques to effectively modulate goal-directed behavior via the body. Taken together, conceptualizing bodily signals transmitted via vagal afferent as catalysts for goal-directed actions opens new avenues for theory-driven translational work that may help contextualize key motivational symptoms as a result of aberrant body-brain interactions.

Symposia session 7

S31 - From Brain Mapping to Behavior: Multimodal Insights into TMS Effects

Samstag 09:00 - 10:30 | Ort TODO

Session chair(s): Ole Numssen, Sandra Martin

MR Center of Excellence, Center for Medical Physics and Biomedical Engineering, Medical University of Vienna

This symposium on transcranial magnetic stimulation (TMS) addresses the urgent need to deepen our understanding of TMS effects on the brain, particularly given the substantial intra- and inter-individual variability in responses. This variability underscores a critical challenge in optimizing TMS for both neuroscience research and clinical applications. We will explore TMS from several complementary angles: its integration with fMRI and EEG, advances in electric field modeling to refine TMS focality and dosage, and assessments of its effects on cognitive function using behavioral and statistical methods.

Maria Vasileiadi will highlight the use of interleaved TMS-fMRI to elucidate how individual differences, cognitive states, and stimulation parameters influence TMS effects and offer ways to improve treatment efficacy. Sybren van Hoornweder will discuss the application of advanced forward models in TMS-EEG to improve our understanding of cortical excitability and the neural basis of TMS responses. Sandra Martin will critically evaluate the differential effects of different TMS protocols on cognitive control and executive functions, highlighting the strategic importance of protocol selection. Ole Numssen will present personalized approaches to TMS, using electric field modeling to tailor interventions based on individual neurophysiological profiles, addressing the need for individualized treatment strategies.

By weaving together insights from EEG, MRI, electric field considerations, and behavioral and statistical analyses, the symposium aims to promote a holistic understanding of TMS. This collaborative approach is critical to advancing TMS research and clinical practice, reducing response variability, and improving the precision and efficacy of neuromodulation techniques.

Vasileiadi M. Variability in interleaved TMS-fMRI responses related to individual factors and cognitive state | 09:00

Hoornweder S. Investigating TMS-Induced Electric Fields and Subsequent EEG Source Fields: Analysing the N15 TMS-EEG Peak Considering Dose and State Effects | 09:20

Martin S. Beyond Motor Effects: The Impact of TMS Protocol Selection on cognitive functions | 09:40

Numssen O. Beyond One-Size-Fits-All: Advancing TMS with Personalized Electric Field Modeling | 10:00

S32 - Revisiting the relationship between autonomic reactivity and affective and threat-related processes

Samstag 09:00 - 10:30 | Ort TODO

Session chair(s): Carlos Ventura-Bort

Victoria University of Wellington

It is widely acknowledged that feelings of excitement or threat often coincide with physiological changes. However, the complexities surrounding affect-related physiological responses, including their connection to emotional experiences, temporal consistency, and relationship to learning processes, remain topics of ongoing debate. Showcasing a wide range of multivariate methodologies, including machine learning and representational similarity analysis on autonomic (SCR, HR, startle) and BOLD fMRI data, this symposium will provide innovative insights into the dynamics of physiological reactions within affect-inducing contexts. First, Hedwig Eisenbarth (Victoria University of Wellington) will present data about the contribution of SCR and HR for determining emotional states in both natural and controlled settings. Next, Alina Koppold (University Medical Center Hamburg-Eppendorf) will explore the relationship between valence, arousal, and SCR and startle blink responses, to clarify whether events eliciting similar affective experiences produce comparable physiological reactions. While the autonomic reactivity pattern elicited by established paradigms such as fear conditioning is well-documented, the question remains as to whether these patterns exhibit temporal stability. To address this, Maren Klingelhoefer-Jens (University Medical Center Hamburg – Eppendorf) will present findings on the temporal robustness of SCR and BOLD fMRI evoked by a fear conditioning paradigm. Lastly, Carlos Ventura-Bort (University of Potsdam) will explore the relationship between autonomic reactivity and learning processes, investigating the correspondence between SCR, startle responses, and measures of associative learning change and uncertainty across a series of fear conditioning studies.

Eisenbarth H. Linking autonomic nervous system activity to body movement and subjective experiences | 09:00

Koppold A. Physiological Harmony or Discord? Unveiling the Correspondence Between Subjective Arousal and Valence and Physiological Responses | 09:20

Klingelhoefer-Jens M. Using representational similarity analysis to assess the temporal stability of SCR and BOLD fMRI in a fear conditioning paradigm | 09:40

Ventura-Bort C. Burned in the skin, stored in an eye blink: The correspondence between SCR, startle, associative learning and uncertainty in the context of an aversive learning task | 10:00

S33 - Using Genetics to Understand Pathways to Mental Disorders

Samstag 09:00 - 10:30 | Ort TODO

Session chair(s): Fabian Streit

Department of Epidemiology and Preventive Medicine, University of Regensburg

The symposium aims to demonstrate how large-scale genetic data can be used to identify pathways that might predispose individuals to mental disorders. Julian Konzok uses genomic structural equation modeling to investigate causal risk factors for internalizing and externalizing mental disorders. He identifies childhood maltreatment as a universal risk factor, while indicating alcohol consumption as a specific risk factor for the externalizing dimension, and physical activity as a specific protective factor for the internalizing dimension.

Javier Schneider Penate's study on the genetics of extinction learning used polygenic scores (PGS) in a well-characterized sample subjected to a fear conditioning paradigm. He shows that the functional connectivity between key brain regions mediates the relationship of genetic risk for anxiety disorders and PTSD with fear learning.

Philippe Jawinski presents results from the ENIGMA-EEG consortium, investigating genetic associations of resting-state EEG oscillations. Using data from nine cohorts and from up to 14,361 participants, the study demonstrates substantial SNP-based heritability, identifies associated genetic loci, and highlights the shared genetic basis with psychiatric traits and brain structure.

Sebastian Markett focuses on white matter tract integrity as a potential intermediate phenotype for depression. Analyzing data from the UK Biobank, the study found that depressive symptoms, genetic predisposition for depression and adverse life events are linked to reduced white matter integrity.

Taken together, these presentations underscore the complex genetic and neurobiological underpinnings of mental disorders, and highlight potential intermediate phenotypes through which genetic and environmental risks might affect mental health.

Konzok J. Genetics of the Externalizing and Internalizing Dimension: Exploring Genetically Predicted Risk Factors | 09:00

Penate J. Polygenic prediction of learned fear responses is mediated by functional connectivity in the human extinction network | 09:20

Jawinski P. Genetics of EEG oscillations reveal novel biological insights into the links between brain structure, brain function, and behavior | 09:40

Markett . White Matter Tract Integrity: An Intermediate Phenotype for Depression? | 10:00

S34 - Up-regulating and down-regulating memory functions by influencing sleep

Samstag 09:00 - 10:30 | Ort TODO

Session chair(s): Nora Roüast, Thomas Schreiner

Hertie-Institute for Clinical Brain Research, University Medical Center Tübingen

It is well established that sleep is crucial for memory consolidation. The memory function of sleep relies on a delicate interplay of physiological mechanisms facilitating memory reprocessing during sleep. Yet, sleep is not occurring in a vacuum and many factors influence sleep-related neural processes with significant down-stream effects on cognitive functioning. It is therefore crucial to investigate how the sleeping brain codes and reprocesses information, how different factors influence these mechanisms and how this might affect memory functioning. Within this symposium, we will initially focus on consolidation-related neural processes obtained by intracranial and surface electrophysiology and how experimental interventions such as targeted memory reactivation (TMR) can alter sleep-physiological markers and memory consolidation. We then broaden the perspective by considering how sleep-related consolidation processes and their manipulation can be harnessed to benefit cognitive functioning in both trauma treatment and everyday life. Firstly, Michael Hahn presents intracranial sleep data on neural population coding efficiency as a mechanism for sleep-related memory consolidation. Thomas Schreiner then examines the relevance of sleep oscillations for TMR triggered memory reactivation using intracranial recordings. Nora Roüast demonstrates that random auditory stimulation can disturb deep sleep physiological markers and declarative memory. Anja Schaich discusses potential benefits of olfactory TMR in sleep on processing traumatic memories and post-traumatic stress disorder treatment. Daniela Ramirez Butavand gives an outlook on how exercise before sleep affects declarative memory performance. Overall, across multiple methodologies, we demonstrate how different interventions can alter sleep processes and thus memory, whilst proposing potential uses of such approaches.

Hahn M. Neural population coding efficiency in the hippocampal-neocortical network during human and rodent sleep | 09:00

Schreiner T. Spindle-locked ripples mediate memory reactivation during human NREM sleep | 09:15

Roüast N. Random auditory stimulation during sleep disrupts slow oscillations and decreases declarative memory consolidation | 09:30

Schaich A. The effect of odour cues during sleep on the efficacy of trauma-focused treatment in post-traumatic stress disorder (PTSD) | 09:45

Butavand D. Raining the sleeping brain: effects of acute exercise on sleep and memory | 10:00

S35 - Neurocognitive mechanisms of cognitive flexibility and attention allocation

Samstag 09:00 - 10:30 | Ort TODO

Session chair(s): Laura Klatt, Anna-Lena Schubert

Leibniz Research Centre for Working Environment and Human Factors

The symposium focuses on cognitive flexibility, a vital skill for navigating the complexities of dynamic environments. Despite its everyday importance, the neurocognitive mechanisms underpinning cognitive flexibility remain poorly understood. This symposium aims to bridge the gap between cognitive psychology and cognitive neuroscience, shedding light on these mechanisms.

The first talk by Laura-Isabelle Klatt will focus on the interplay between sensory modalities in a dynamic environment, requiring flexible shifts of spatial attention. Specifically, she will present behavioral and electrophysiological data demonstrating how sound localization and auditory spatial attention are influenced by bimodal odorant stimulation. Philipp Musfeld will follow with the second talk, exploring how working memory and long-term memory flexibly interact to optimize resource allocation within the limited capacity of our cognitive system. Specifically, using behavioral and electrophysiological data, his talk investigates how we learn regularities in our environment from repeated exposure and challenges the predominant view that such learning processes occur implicitly. In the third talk, Jan Göttmann will discuss findings from two novel working memory tasks. His talk will explore the interplay between computational model parameters indicative of working memory target and distractor processing, and the electrophysiological markers of attention allocation in complex span tasks. Lastly, Anna-Lena Schubert's talk will present insights from an individual differences study that examines the manifestation of cognitive flexibility in frontal midline theta connectivity and probes the interrelationships among these neural measures, their task-based variations, and general cognitive abilities.

Klatt L. Odorant-induced Sound Localization Bias: Behavioral Evidence and Neurophysiological Correlates | 09:00

Musfeld P. Repetition Learning Depends on Explicit Retrieval from Episodic Memory: Evidence from Behavioral and Neuroimaging Studies | 09:20

Göttmann J. Simulate, Develop, Infer: Measuring Individual differences in Working Memory Processes | 09:40

Schubert A. Temporal Dynamics of Global Theta Connectivity in Relation to Intelligence: Evidence from Three Cognitive Flexibility Tasks | 10:00