Abstracts



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Table of Content

TeaP 2024 was kindly supported by 3
Keynotes 4
Symposia 6
Talks and Posters 35
Author Index 577
Support 590
Imprint 590

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Keynotes

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What happened to Ebbinghaus' second category of memories? Basic findings on involuntary autobiographical memories

Dorthe Berntsen
Center on Autobiographical Memory Research, Aarhus University, Denmark

Involuntary autobiographical memories are memories of personal events that come to mind spontaneously – that is, with no preceding attempt at retrieval. Such spontaneously arising memories were described by Ebbinghaus (1885) as one of three basic modes of memory, but were long ignored by modern memory research. In clinical psychology, involuntary memories of past events were studied for decades, but with an exclusive focus on intrusive memories for negative, stressful events related to psychological disorders. In this lecture, I will review an upsurge of research on involuntary memories conducted over the last couple of decades using naturalistic, experimental, and brain imaging methodologies and involving a range of different study populations. This research has shown that involuntary memories of past events rather than being rare or focusing on negative events (as was long thought) are highly frequent in daily life, and predominantly deal with emotionally positive and mundane events from the recent past. They share many similarities with intentionally retrieved memories of past events regarding content and qualities, but critical differences regarding mode of activation. They represent a context-sensitive, associative and relatively automatic way of recollecting past events that involves little executive control, and likely is an evolutionary and ontogenetically forerunner of strategic retrieval of past events.

Learning to be in control

Senne Braem
Ghent University, Belgium

Much of human behavior is characterized by the extraordinary ability to quickly reconfigure our mind, inhibit prepotent responses, and switch between different tasks, often referred to as cognitive control (or executive functions). When defining cognitive control, it is often contrasted with arguably more low-level forms of learning, such as stimulus-response learning. However, this traditional definition of cognitive control might have put us on the wrong path when trying to understand the training of, development of, and impairments in these control processes. Therefore, in this talk, I will present a set of studies that focus on how optimal cognitive control processes, decision making strategies, or reinforcement learning parameters can be learned through selective reinforcement or contextual cueing. I will argue that this form of learning even seems necessary, to allow for several forms of flexible, dynamic adaptations in control parameters. Together, these results argue for a more integrative learning perspective on cognitive control.

Object recognition in humans and artificial neural networks in naturalistic visual tasks

Marieke Mur
The Brain and Mind Institute, Western University, Canada

Deep artificial neural networks are promising computational models of the human ventral visual system. Neural networks show impressive performance on image recognition tasks. Furthermore, they account for significant proportions of variance in human brain responses and behavior measured during image recognition tasks. However, neural networks also fail to account for significant proportions of variance in human responses to images, especially during more naturalistic visual tasks such as recognizing objects under occlusion. I will show work from my lab that highlights both the potential and the shortcomings of contemporary neural networks as models of human vision. I will argue for the need for a more human-like learning experience, including a more naturalistic visual diet and learning goals, to transform neural networks from powerful image recognizers to human-like object perceivers.

Symposia

Adaptive Retrieval Practice and its Applications in Education and Health

Maarten van der Velde[1] & Hedderik Van Rijn[2]
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The goal of adaptive retrieval practice is to provide a learning experience that is tailored to the individual, so that they can study at an appropriately challenging level. In this symposium, we focus on a cognitive psychology-based approach to adaptive retrieval practice, in which a cognitive model of the learner is embedded inside a digital learning environment and continually updated on the basis of the learners' performance. Estimating the parameters of an individual's cognitive system makes it possible to adapt the learning experience on the fly, but also leads to deeper insight in their ability to acquire and retain information. We discuss some of the theoretical insights and challenges that result from this approach, as well as several practical applications of adaptive retrieval practice in education and health. The ability to accurately estimate the speed at which an individual forgets what they have learned enables targeted assessment and intervention. In an educational setting, an online assessment of a learner's mastery of the material may reduce the need for traditional knowledge tests, provided that such an assessment is accurate and equitable. In the clinical domain, changes in the speed of forgetting of patients may be used to detect and track memory impairments resulting from cognitive decline, migraine or brain injury in an accessible, non-invasive way.

Advances in Developmental Cognitive Neuroscience

Moritz Köster
University of Regensburg

The past decades have seen an increasing interest in studying the brain basis of human development. Critical methodological advances have been made in assessing developmental and the field has moved to applying state-of-art analyses methods to developmental populations across the lifespan. This Symposium brings together a selection of topics that have recently been investigated and discussed within this still young area of research. Anna Bánki will report her research on how early social interactions shape infants' visual attention and perception, based on interactional (and dual) electroencephalogram (EEG) assessments of infants and their caregivers. Charlotte Grosse Wiesmann will present and discuss new methods in developmental cognitive neuroscience to illuminate the development of Theory of Mind, using EEG and functional neuroimaging (fMRI) in infants and children. Michael Skeide presents his work on how neural population coding (in ultra-high-field magnetic resonance imaging at 7 Tesla) can inform us about quantity perception in children and adults. This will be followed by three talks discussing learning and memory development across the lifespan from different angles: Markus Werkle-Bergner investigates the links between brain and memory development in early and middle childhood. Moritz Köster laverages the theta rhythm and theta gamma-coupling as neural signatures for studying brain development in infants, children and adults. Ben Eppinger will present the diminished state space theory of human aging and discuss first empirical evidence in support of this theory. Taken together, we hope that this symposium will provide an exciting overview on some of the most recent advances in Developmental Cognitive Neuroscience, as a rapidly evolving area of research.

Affect, motivation and control I + II

David Dignath[1] & Kerstin Fröber[2,3]
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Emotions sometimes have a bad reputation in cognitive control research, probably because emotions can be powerful distractors that challenge controlled behavior. Not surprisingly, theoretical accounts often characterize emotions as antagonists to controlled behavior. In the “emotion” part of this symposium, we will focus on a different perspective, which assumes that emotions can have a functional role as both output and input to controlled processes. Several talks will address how affective states result from controlled processing and how controlled processes can be modulated by emotional stimuli.
Emotions can also be an important driver for behavior, and the question how motivational processes contribute to controlled processes has become central in recent theoretical models of cognitive control. In the “motivation” part of the symposium, we will learn how controlled processes trigger motivation and how rewards modulate controlled processes. The symposium will discuss emotions and motivation as an integral part of ´cognitive´ control, contributing to a better understanding of adaptations, problems and failures of control.

AI and decision-making: Insights from varied applied settings

Julia Cecil
Ludwigs-Maximilians-Universität München

As AI technology increasingly integrates into daily life and work, comprehending its influence on cognitive processes is crucial. This symposium explores the role of AI in decision-making, sharing recent findings on human-AI-interaction across diverse application fields.
The first talk by Ekaterina Jussupow focuses on metacognitions in AI-augmented decision-making which help individuals determine when they need additional support and allow them to reject inaccurate AI advice. Data from a large-scale experiment on medical decision-making is used to analyze the most appropriate measure of metacognitive accuracy for confidence judgements and examine the relationship between participants' metacognitive accuracy and their performance.
The second talk by Désirée Zercher explores the effect of generative AI systems on team decision-making processes. To answer how AI-based decision support affects team decision-making processes and outcomes, an experimental study was conducted: in a hidden profile scenario, teams without AI support were compared to those using fully or partially informed generative AI systems.
In the third talk by Julia Cecil, the effect of explainable AI-based advice on people's decision-making in a personnel selection task is discussed. Despite the potential of explainable AI to enhance user understanding and acceptance, findings are mixed. This study examines the impact of AI-based advice, with or without explanations, on decision performance, perceived advice quality and decision confidence in a personnel selection task.
The fourth talk by Eesha Kokje centers on AI-based facial recognition tools, which are increasingly being used in the process of identity verification using photo IDs. A series of experiments were conducted to examine whether and how recommendations from AI-based decision aids influence the face matching performance of humans, and the design factors to be taken into consideration to enhance performance.
The fifth talk by Nadine Schlicker addresses the influence of data quality on AI-supported clinical decision-making. Findings from a study investigating the effects of AI-based clinical decision support (CDS) in digital auscultation on physician decision-making will be presented. Using a 2 (degree of automation: information analysis vs. decision selection) x 2 (data quality: noisy vs. normal audio recordings) mixed design, physicians' trust in CDS and their diagnostic calibration will be assessed.

Better together? Benefits and costs of joint action

Basil Wahn[1], Miles Tufft[2], & Laura Schmitz[3]
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In daily life, people often perform tasks together to attain a shared goal. For instance, people jointly solve puzzles, prepare a meal, or search for a misplaced key. While such joint actions are often beneficial (e.g., the misplaced key is found faster if we search together), there are also situations in which the costs of an interaction outweigh its benefits (e.g., jointly coordinating a search strategy might take longer than searching alone). When and how do we achieve benefits by acting jointly? And how to define such "benefits" in the first place? In this symposium, we aim to shed light on these questions by presenting various types of benefits (and costs) in joint action scenarios, while also discussing the different underlying strategies and mechanisms (e.g., 'division of labor', 'social offloading', 'confidence sharing', 'co-representation', or 'sensorimotor communication'). We draw on research from different fields of cognitive psychology such as perception, attention, memory, and motor learning, with the aim to identify connections and common mechanisms.

Changes for learning: how do changes in task-specific representations shape adaptive cognitive control?

Sina Schwarze [1], Yana Fandakova [2]
[1] *Max Planck Institute for Human Development,* [2] *University of Trier*

Cognitive control enables humans to flexibly align their behavior with their goals in changing environments and to learn to adapt to novel tasks. As such, cognitive control critically depends on the ability to develop, flexibly maintain, and adjust task-specific representations of goal-relevant cues, stimuli, and actions. However, while it is widely accepted that cognitive control abilities improve during child development and are shaped by learning, it is still unclear how these changes are associated with concurrent changes in underlying representations. In this symposium, we aim to tackle the ways in which task-specific representations shape cognitive control and change with learning by integrating findings from experimental and developmental psychology, and cognitive neuroscience. By this, we will build on interdisciplinary exchange to understand how task representations change over time to support cognitive control and facilitate learning. The first presentation will discuss flexible representations of task order and how these allow for adaptive multitasking. The second presentation will examine how performance improvements with dual-task practice are linked to changing task representations in sensory brain regions. The third presentation explores how children's representations during task switching are influenced by repeated experience with tasks of similar structure. The fourth presentation will examine how sequence-specific representations in the motor cortex change with learning of motor sequences and decreasing control demand. The fifth presentation will focus on adaptive learning strategies during learning of complex hierarchical task structures. In the final discussion, we will integrate these findings and discuss future directions on the role of specific features of representations and representational structure for effective learning.

Cognitive and Neural Processes Underlying the Perception of Actions, Scenes and Objects I + II

Marius Zimmermann, Angelika Lingnau
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Being able to interact with our environment relies on rich sources of information regarding other people and their actions, as well as objects and scenes in their surrounding. In this double-symposium, we will discuss new emerging viewpoints and current debates, empirical data that speak to these debates, as well as recent methodological developments (e.g. the combination of neuroimaging and deep neural networks; the use of naturalistic stimuli; time-resolved decoding). We will conclude with an integration of the results and a discussion of open questions and future directions, involving the speakers and the audience.

Cognitive and Neural Processes Underlying the Perception of Odors

Jens Schwarzbach[1] & Thomas Hummel[2]
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Olfaction is a complex sense that is less explored than other senses. Yet, it plays a major role in arousal, memory, our emotions and well-being, as well as in neurological and psychiatric disorders. In this symposium we will discuss basic physiological mechanisms, the influence of body odors on social cognition, the psychological effect of olfactory loss and its recovery through training, as well as new developments in how to study mental and neural representations of odors in humans.
We will conclude with an integration of the results and a discussion of open questions and future directions, involving the speakers and the audience.

Collective remembering: Social processes and the representation of public events in human memory

Magdalena Abel[1] & Ryan P. Hackländer[2]
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Research on collective memory examines how groups reach a shared representation of the past. For smaller social groups, the focus is often on cognitive processes occurring during social interactions; for larger social groups, it is often on examining memory for large-scale public events. This symposium brings together different strands of research on collective remembering. Focusing on remembering in smaller social groups, Magdalena Abel will present research on how collaborative remembering supports the development of shared memories. Ullrich Wagner will then talk about contributions of biased memory in the context of shared reality creation. Turning to larger social groups, Michiko Sakaki will cover the role of emotional valence for memory of the UK Brexit referendum. Lynn Ann Watson will report on a multi-national study on memory during the COVID-19 pandemic. Finally, Meymune Topçu will focus on the relationship between collective memory, future thinking, and collective anxiety. In addition to the five talks, a final discussion slot will provide opportunity to discuss overlap and joint themes across studies, as well as potential avenues for future research.

Computational modeling in experimental psychology: Linking model-based and processtracing analyses

Thorsten Pachur & Chris Donkin[3]
[1] *Technical University of Munich,* [2] *Max Planck Institute for Human Development, Berlin,* [3]*LMU Munich*

Analyzing behavior with computational models is a powerful and increasingly popular approach to disentangle the psychological processes underlying behavior. A particular merit of computational modeling is that it promises to measure latent, not directly observable mental processes (e.g., attention or memory). At the same time, there exist several processtracing methodologies (e.g., eye-tracking, verbal protocols) that attempt to measure indicators of mental processes more directly. While these two approaches to study cognitive processes are usually pursued separately from each other, the goal of this symposium is to present exciting recent advances in computational modeling that combine model-based and processtracing analyses. The contribution by Jennifer March demonstrates how supplanting computational modeling with measures of how attention is distributed across attributes can foster an understanding of individual differences in food choice. Florian Bolenz presents a modeling analysis that reveals how attention allocation to attributes in risky choice follows an interactive dynamic process. In addition, he shows how differences between younger and older adults in these attentional processes accompany age differences in preference. In the talk by Florian Seitz, eye-tracking measures of attention during multiple-cue judgment are used to test assumptions about memory processes derived from computational analyses of people's use of judgment strategies. Veronika Lerche connects decision and response-time data in analyses with a drift-diffusion model to clarify behavioral differences between younger and olds adults across a range of cognitive tasks. Specifically, she shows how the contribution of age difference in the speed of information accumulation to age differences in behavior depends on task difficulty. In the contribution by Tehilla Ostrovsky, computational modeling is linked to verbal reports on the cognitive strategies that participants employed during a memory task. Thereby he authors explore and validate the theoretical assumptions made in the computational modeling. Finally, the talk by David Izydorczyk showcases how insights about the cognitive representation of real-world objects (e.g., birds) derived from multidimensional scaling can be integrated in computational modeling analyses of strategy use in quantitative judgment.

Current Developments in Evaluative Conditioning: Methodologies, Mechanisms, and Manifestations

Moritz Ingendahl
Ruhr University Bochum

Evaluative Conditioning (EC) is the change in liking of a conditioned stimulus due to its pairing with other positive/negative stimuli and a central effect in cognitive and social psychology. This symposium encompasses six pivotal talks that delve into the methodology, mechanisms, and manifestation of EC from varied angles. Starting with the current methodological developments in EC research, the first talk scrutinizes replication disparities of EC effects across digital and lab settings based on the Causal Replication Framework. The next talk discusses the methodological intricacies in studying the role of relational information in EC, in particular, the discrepancy between assimilative and contrastive relations. Afterward, the symposium will turn to the cognitive mechanisms underlying EC, focusing on the controllability of EC effects. Our third talk will focus on the role of metacognitive monitoring in EC and merge the disciplines of metamemory and attitude formation. The fourth talk unravels the underlying strategies and representations when people try to control EC effects. Last, the symposium will present new evidence on the manifestations of EC effects. The fifth talk emphasizes the role of autonomous choices in EC, detailing when and why sampling stimulus pairings impacts evaluations of conditioned stimuli. The last talk explores how emotional valence influences speech intelligibility amidst noise, showing the value of EC as a framework for studying cognitive processes in general. Together, our symposium offers a consolidated view on EC, connecting current methodologies with cognitive mechanisms and behavioral manifestations.

Egocentric and allocentric reference frames: Integrating across measures, task complexity, and spatial scales

Bianca Baltaretu [1], Meaghan McManus, & Katja Fiehler
Justus Liebig University Giessen

In everyday life, we use current and remembered information about our environment to help us navigate and interact with the objects therein. As we move, we can update object locations with respect to ourselves (i.e., relative to the eyes, head, or hand) using an egocentric reference frame. However, we can also rely on allocentric coding, where objects are coded with respect to other objects. In this symposium, we will focus on understanding how we toggle between egocentric and allocentric coding for perception and action, for simple to complex stimuli in simplistic to complex environments, at both the behavioural and neural level. First, we will discuss how spatial behaviours are presently understood and what neural representations are necessary to establish these. Then, we will focus on how encoding our position in large-scale environments affects our memory-guided actions, as well as the accompanying cortical recruitment associated with navigating those environments. This will be followed by findings related to how allocentric coding of objects in naturalistic (virtual) scenes is affected by cognitive factors, and the associated neural underpinnings that are required to induce appropriate reaches to surrounding objects. Lastly, the session will end with a synthesis of currently used and novel paradigms that will assist in understanding the dynamics that underlie spatial encoding. Overall, this symposium will provide an up-to-date evaluation of the behavioural and neural components of egocentric and allocentric coding for interaction and navigation.

Episodic retrieval of recent stimulus-response episodes as a source of cognitive control and learning

Carina G. Giesen [1] & Klaus Rothermund [2]
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When we perceive a stimulus, we may respond in a multitude of ways. Often, however, our behaviour is not as variable as we would assume. Instead, there is a high likelihood that our current response will equal the response we gave on the *last previous occurrence* of the very same stimulus. This principle is captured in the *law of recency* (Giesen et al., 2020), which posits that action control processes often rely on retrieval of previous stimulus-response (SR) episodes from memory. Episodic retrieval will activate the response that was executed during the most recent episode in which the stimulus was presented before. To date, episodic retrieval of most recent episodes can explain contingency learning effects as well as findings that are typically attributed to adaptations of cognitive control (e.g., proportion congruency effects, Rothermund et al., 2022). In the current Symposium, further evidence for the role of episodic retrieval of most recent previous SR episodes will be presented. Findings stem from a broad field of research areas and document recency retrieval processes in evaluative and color-word contigency learning, motoric sequence learning, cognitive control in basic and applied settings and habit formation. We will also discuss factors that limit the explanatory power of episodic retrieval of recent episodes, as for instance contingency awareness and rule detection.

Experimental Aesthetics I + II

Maria Manolika, Thomas Jacobsen
Experimental Psychology Unit of the Helmut Schmidt University/University of the Federal Armed Forces Hamburg

The interdisciplinary endeavor within Experimental Aesthetics invites a blend of traditional inquiry and novel explorations. Central to the discussion are themes that venture into digital mediums, interactive experiences, and emerging aesthetics tied to contemporary forms of expression. While acknowledging a rich historical backdrop, the focus inclines towards understanding the influence of factors such as cognitive load, emotional resonance, and personality variances on aesthetic appreciation amidst evolving mediums such as digital arts, body modifications, varied music styles, and modern architecture. By probing the impact of multi-modal stimuli on aesthetic responses, this initiative aspires to unveil nuanced understandings and foster a broader empirical discourse, contributing to the evolving Experimental Aesthetics.

Experimental Engineering Psychology and Human Factors I + II

Martin Baumann [1] & Stefan Brandenburg[2]
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The facilitated integration of technology into people's lives highlights the importance of examining its impact on experience and behavior. Experimental approaches help to determine the underlying psychological processes of this impact. This first part of the symposium summarizes experimental studies examining various contexts of technology use and psychological aspects of Engineering Psychology and Human Factors. Applying various experimental approaches these talks address major concepts of Engineering Psychology and Human Factors, such as situation awareness, cognitive load, technology adaptation in classical domains such as human-AI interaction, human-automation interaction, teleoperation. In the first talk Eva Gößwein will focus on the vital importance of adaptation in our interactions with emerging technologies and its pivotal role in shaping human behaviour within an increasingly complex environment. The second talk by Anne Voormann will present the results of an experiment on the effects of the perception of hand-arm vibration on cognitive control and the third talk by Matthias Arend will show results from an experimental study on compatibility effects in teleoperated grasping as an implicit measure of situation awareness. In the fourth talk Elisabeth Wögerbauer will addresses the topic of personal space in interactions with drones. The results of two laboratory studies will be presented. Finally, Tim Schrills' talk will show results from an experiment on the effects of a training for novices enabling them to experience and understand the effects of their own actions within an AI-guided deep vein diagnosis system.
In the second part of the symposium we bring together examples of experimental approaches in Engineering Psychology and Human Factors in the field of traffic ranging from online studies over lab studies to studies in high-fidelity driving simulation environments. The symposium starts with the talk of Markus Gödker who will present a taxonomy of driving scenes to support the design of driving simulator experiments for investigating energy-efficient driving. Results of first validation studies of the this taxonomy will be shown. In the second talk Linda Miller will present results from an experimental study on the effects of situational characteristics on behavior of drivers when negotiating priority in narrow passage situations. The third talk from Claudia Buchner will present the results of an experimental study in a high-fidelity driving simulator on the influence of cognitive workload on the development of mental models about advanced driver assistance systems. In the fourth presentation of this symposium Andreas Schrank will present results from an experiment in the domain of remote vehicle operation. In their study they evaluated different HMI concepts for the augmentation of such video streams to support the remote operators in terms of situation awareness, workload, performance and usability. The two parts of the symposium will be completed with a discussion addressing both the results of the studies and aspects of the methodological approaches with all contributors of both parts of symposium.

Feature binding in action control and beyond I+II: How binding contributes to stimulus-response learning, cognitive control, and event segmentation

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It is still debated how humans can engage in goal-directed behaviour with apparent ease. Research suggests that the processes of feature binding and episodic retrieval may underlie various simple as well as complex actions, thus requiring understanding and forecasting their impact on such actions. Hence, a unifying framework (BRAC; Frings et al., 2020) emerged to specify binding and retrieval in action control across different experimental phenomena and paradigms.
This first symposium discusses the role of binding and retrieval in two significant research domains: learning and cognitive control.
The relation between binding and learning has been extensively debated. The first talk enumerates three potential factors contributing to the transformation of bindings into learning, including the temporal gap between the formation of a binding and its subsequent retrieval. The second talk picks up on this temporal gap providing highly-powered evidence that repetition of a feature can retrieve both long- and short-term bindings in a well-established cognitive control paradigm (i.e., task-switching).
Binding processes in cognitive control are often considered supplementary processes influencing performance while occurring concurrently with goal-related processes. Interestingly, however, the third talk proposes that cognitive control may be regulated by binding together packages of information through neural synchronization. The fourth talk investigates whether the dynamic unbinding of task-set components in task switching serves as an adaptive strategy when facing task uncertainty. Similarly, the fifth talk explores whether task-set components are represented—and therefore updated—independently (cf., being bound into a single representation) in task switching, and what affects their retrieval.

The second symposium addresses the link between events in the sense of BRAC, i.e., stimulus-response episodes, and events in the sense of Event Segmentation Theory (Zacks et al., 2007), i.e., meaningful segments in a continuous stream of information, as well as the influence of social factors on binding and retrieval.
The first talk presents findings from a series of experiments using temporal organization factors, such as temporal adverbials and stimulus onset asynchrony, to investigate the role of segmentation in the binding and retrieval of stimulus-response episodes. The second talk examines the influence of event segmentation on binding between responses, i.e., whether responses must belong to the same event to be bound and retrieved together. In the third talk, findings on event segmentation of a short film in adults, adolescents, and ADHD patients are summarized at the behavioural and neurophysiological levels, and it is shown that social cues in particular are relevant for triggering event segmentation. The relevance of social aspects for stimulus-response binding is discussed in the fourth presentation, which focuses in particular on observationally acquired stimulus-response binding and retrieval.
These two symposia aim to stimulate discussions regarding the role of binding and retrieval in well-studied phenomena such as event segmentation, learning and learning from others and cognitive control, for example in multitasking settings.

Harnessing Gaze - Eyes for Information, Communication, and Understanding

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From observing people's eyes, eye-tracking research has gained insight into a vast amount of perceptual and cognitive processing, thereby enhancing psychological models of human perception, cognition, and action. Harnessing gaze is of special interest when it comes to interaction. Recent developments in eye-tracking technology such as the shrinking size of eye-tracking hardware and the advancement of machine learning offer great potential for understanding human-human interaction better on the one hand and improving pervasive human-computer interaction applications on the other hand.
Thus, current eye-tracking research explores novel forms of gaze interaction that rely on current psychological theories and findings, computational modeling, as well as expertise in highly promising application domains. The Symposium's contributions work at the boundaries of gaze interaction.
Giulia Manca will showcase opportunities of recent technological developments from an applied perspective in the context of consumer behavior raising the question of which and how gaze parameters can be harnessed. Valentin Foucher presents work about harnessing gaze parameters in the context of detecting lying intentions.
In the context of human-human interaction the impact of various features of dyadic gaze dynamics on different outcome measures of interpersonal contact are explored. Eva Landmann presents evidence that shows the influence of the emotional context of the conversation on evaluating the listener's gaze as appropriate. Further, Julian Gutzeit shows that more (subjectively perceived) mutual gaze contact is associated to increased social connectedness compared to when more gaze aversion is perceived. Mehtap Cakir will discuss parameters of mutual gaze which indicate interpersonal synchronization, especially eye blinks.

How do auditory and speech processing alterations contribute to symptoms in psychosis: a predictive coding approach

Franziska Knolle [1, 2] & Elisabeth Sterner [1]

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Alterations in speech represent a core symptom of schizophrenia. Generally referred to as formal thought disorder, already Kraepelin identified subsets of patients exhibiting significant speech disturbances, which he termed 'schizophasia'. Today, substantial evidence emphasizes the significance of speech and auditory processing dysfunction as a prominent symptom of schizophrenia. However, the understandings of the neurobiological mechanisms are limited. The goal of this symposium is to discuss if and how auditory and speech alterations contribute to the development or aggravation of symptoms, and to provide evidence for some neurobiological mechanism underlying the alterations.
Importantly, all data presented will be discussed within the unifying framework of predictive coding, allowing a comparison across studies. This enhances the mechanistic understanding of speech and auditory dysfunctions and their symptom associations.
Daniel Hauke (UCL) will discuss how mismatch negativity reductions during auditory processing – an established biomarker of schizophrenia – can be cast as predictive coding. His work shows that deficits in predictive coding are more pronounced in at risk individuals, who convert to a psychotic disorder within two years, compared to non-converters and may thus serve as predictive biomarkers and mechanistic targets for novel interventions in the future.
Ana Pinhiero (University of Lisbon) will discuss how alterations in predictive processes during the perception of voices, such as aberrant encoding of prediction errors, may account for auditory verbal hallucinations. Using behavioural and EEG she will illustrate how alterations in the dynamic neurocognitive operations during the prediction of and reaction to unexpected changes in voice stimuli may underlie phantom voice perception.
Elisabeth Sterner (TUM/LMU) will focus on how impairments in the integration of semantic predictions and sensory information during language processing are manifested in individuals with psychotic-like experiences. For this, she will use the predictive coding framework to show how alterations of the N400 – a neurophysiological signature of a prediction error – and timefrequency representations may contribute to processing errors and give rise to misperceptions.
Franziska Knolle (TUM/University of Cambridge) will discuss how the use of prior knowledge and sensory information changes when patients with schizophrenia transition from a state of active psychosis to psychotic transmission. Using a Bayesian language paradigm, she will show that positive symptoms are linked to an overweighting of prior to sensory information, which is neutralised when patients reach remission.
This state-of-the-art symposium demonstrates that predictive coding provides important insights in dysfunctions underlying auditory and speech processing and their mechanistic contribution to symptom development, and may provide starting points for therapeutic interventions.

Innovative methods for assessing emotion recognition, interoception and stress processing in children and adolescents

Irina Jarvers
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In the domain of children and adolescents, research development has been comparatively slower, owing in part to stringent but necessary regulations in place to protect children, as well as the consideration of factors such as development that uniquely influence research methodologies and outcomes. Furthermore, existing methods in adult research are lacking practical applicability for child and adolescent psychiatry and might not harness the full potential of digital technologies. In this symposium we're introducing innovative methods to the existing research methods in child and adolescent psychiatry in areas of emotion recognition, interoception, and stress processing. Our approach involves the use of electronic/digital media such as virtual reality (VR) and mobile apps, employing multimodal data collection including subjective ratings and physiological measures and novel analysis techniques like machine learning for clinical and non-clinical settings. The overarching goal is to promote the application of innovative research methods, particularly in the context of childhood and adolescence, to better understand and support these critical developmental stages.

Methods in reading and language research

Xenia Schmalz
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Language and reading research bridges experimental methods and big data approaches: even when experimental methods are used, big data approaches are required (1) to select stimulus materials, and (2) to analyse the participants' responses, which by themselves often yield rich data and multiple behavioural measures. The symposium combines talks focused on methodology, as well as examples of different facets where complex research methods provide important insights into language and reading processes.
The first talk uses a set of theoretical and theory-neutral approaches to quantify crosslinguistic differences in orthographic depth. The second talk focuses on rating norms of word stimuli (e.g., orthographic similarity, concreteness, familiarity, etc.), which are commonly used in reading and visual word recognition studies. It presents statistical methods to improve the validity of these norming datasets. The third talk takes a LLM approach to derive language-level information that is needed for designing psycholinguistic experiments. The fourth talk examines the transparency and reproducibility of research methods in a subfield of reading research: studies on developmental dyslexia. The fifth talk uses linguistic data derived from corpora to examine the effect of collocation frequency on reading comprehension. The final approach combines computational modelling and machine learning techniques to gain insights into visual processes during reading. As such, different approaches from corpus linguistics, computational modelling, psychometrics, and machine learning, are represented.

Modulation of Impulsive Choice and Impulsive Action

Ulrich Ettinger
Department of Psychology, University of Bonn

Impulsivity is a broad umbrella construct that can be measured using a variety of methodological approaches. This symposium focusses on experimental measures of impulsive choice and impulsive action. Studies are presented that modulate performance in relevant tasks in healthy samples with the broad overall aim of identifying mechanistic pathways through which impulse control can be targeted, with particular implications for clinical disorders such as substance abuse. In the first talk, Elke Smith (Cologne) will report effects of enhancing dopamine transmission on intertemporal choice. While L-DOPA reduced discounting in healthy adults, there was no evidence that drug effects were modulated by putative dopamine proxies including spontaneous blink rate or levels of impulsivity. Next, Kristof Keidel (Bonn) will discuss eye-tracking and functional magnetic resonance imaging (fMRI) studies of the date/delay effect in intertemporal choice. The date condition, which consistently led to reduced temporal discounting, was associated with more eye movements comparing and fixating time attributes, a potentially higher weighting of reward attributes and higher activations of brain areas associated with episodic thinking. Volker Thoma (East London) will then present evidence from bilateral transcranial direct current stimulation (tDCS) of dorsolateral prefrontal cortex (DLPFC). Whilst anodal tDCS to right DLPFC increased cognitive reflection, data from gambling task performance in low and high impulsive individuals showed no difference between dorsal and ventral areas of the PFC. Finally, Carmen Weidler (Aachen) will present findings from an fMRI study with high-definition (HD) tDCS of right inferior frontal gyrus in smokers and non-smokers. Stop signal reaction time (SSRT) improved from pre- to post-stimulation in both groups following sham stimulation, whereas HD-tDCS lead to shorter SSRT only in non-smokers, suggesting that active stimulation suppressed training effects in smokers.

Multitasking and Cognitive Control I + II

Jovita Brüning [1] & Inga Lück [2]
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The processing of multiple tasks is challenging, as evidenced by the fact that these task environments often impose substantial performance costs. Cognitive control is essential as it determines how we approach the demand of processing multiple tasks and potentially overcome or at least reduce the challenges arising in such situations.
This symposium features current advances in investigations on how task sets are represented and used to explain how exactly cognitive control is administered in multitasking environments. The contributions will discuss how external context characteristics shape task and control processing, such as changing stimulus features, repeating or switching responses and a varying degree of response conflict as well as the influence of timing characteristics (stimulus onset asynchrony, inter-trial interval, response-cue interval) of the tasks. Furthermore, we will look how internal factors can modulate cognitive control. For example, how motivation and individual preferences can limit or enhance the flexible adaptation when multiple tasks are processed.

Progress in TVA-based Visual Attention Research: From Fundamentals to Applications I + II

Jan Tünnermann [1] & Ingrid Scharlau [2]
[1] *Philipps-Universität Marburg,* [2] *Paderborn University*

Bundesen's Theory of Visual Attention (TVA) is a general framework for comprehending visual processing and attention. It proposes that visual processing is a competition among categorizations, contending for attentional resources and access to visual short-term memory. TVA, a model with mathematical rigor, serves as a bridge between empirical data and theoretical concepts, facilitating a precise and quantitative elucidation of various attentional phenomena. This symposium assembles a diverse array of research utilizing TVA. The talks encompass different domains, ranging from fundamental models of attentional processes to practical applications in clinical and intervention settings. Petersen presents a TVA-based model of the Attentional Blink, shedding light on the intricate mechanisms underlying this phenomenon. Blurton et al. delve into the Simon and Stroop effects within the context of a pure accuracy task. Advancements in simulating visual foraging behavior with TVA are explored by Tünnermann et al. Scheller et al. investigate how self-relevance modulates early attention selection from a TVA-based perspective. Sørensen's talk addresses the question of how expertise shapes perception, leveraging insights derived from TVA. These talks expand TVA's modeling of attentional phenomena from its initial area (whole and partial report) to phenomena that have driven much of cognitive psychology's process in other attentional domains. They raise the quite critical question of how general the TVA's claim to model attention can actually be. Moving into applied intervention and clinical contexts, Schrenk et al. examine the effects of physical activity on TVA parameters and other cognitive measures in older adults. Martin et al. present findings on the impact of cognitive training on parameter visual processing speed in post-COVID patients, highlighting the potential of TVA in understanding cognitive recovery. Menrad et al. scrutinize ADHD through the lens of TVA, providing fresh insights into attentional parameters in this population. Gillebert uses TVA to investigate post-stroke visual hypersensitivity. These talks on applied research topics illustrate the poentency of TVA and its applicability across a wide range of clinical research domains. The symposium concludes by a General Discussion, affording an opportunity to synthesize the insights presented and to explore avenues for further integration with TVA-based models.

Psychological factors in chronic pain: Recent experimental results

Annette Löffler
Department of Psychiatry, Psychotherapy and Psychosomatics, Faculty of Medicine, RWTH Aachen, Aachen, Germany, Department of Psychosomatic Medicine and Psychotherapy, Central Institute of Mental Health, Medical Faculty Mannheim, Heidelberg University, Mannheim, Germany, Department of Cognitive and Clinical Neuroscience, Central Institute of Mental Health, Medical Faculty Mannheim, Heidelberg University, Mannheim, Germany

Chronic pain is a complex and multifaced condition that places high burdens on both the affected individual and the healthcare system. Whereas acute pain warns of a medical condition or injury that should be treated accordingly, chronic pain has lost this warning function. Several psychological factors play a role in pain perception and the development and maintenance of chronic pain and are therefore the subject of current psychological pain research. The present symposium brings together pain researchers with a psychological background to provide new findings in experimental psychological research on chronic pain and its neurobehavioral underpinnings. Robin Bekrater-Bodmann (RWTH Aachen University) will present experimental and survey data on the interaction between body cognition and phantom pain in limb amputees, and will discuss the bidirectional link between central body representations and pain perception. Benjamin Mosch (Bochum University) will talk about the effect of control over pain on its perception and the underlying neural mechanisms, based on findings of a recent study in individuals with fibromyalgia. Simon Desch (Düsseldorf University) will introduce pain relief as a crucial learning signal that guides behavior to avoid pain or escape from it. He will present recent results on endogenous modulation of pain relief in a probabilistic pain relief-seeking task that was used to probe pharmacological manipulations and to compare individuals with and without chronic pain. Finally, Annette Löffler (RWTH Aachen University) will present recent results on dysfunctional pain behavior and reward learning in chronic pain. Thereby, she will focus not only on differences between individuals with and without chronic pain but also between subgroups of individuals with chronic pain.

Rationalizing on the Constraints and Structure of Cognitive Control – Lessons from Laboratory and Field Assessments

Yannik Hilla
LMU Munich

Cognitive control enables individuals to perform complex tasks, for instance, steering an aircraft. This requires the flexible allocation of attentional resources, to update and process information, as well as to recall appropriate task representations. Under these multitasking conditions, performance declines over the course of time. Thus, cognitive control appears to be capacity-limited. This can be an issue, because attenuated performance in steering an aircraft may result in safety-critical incidents. A better understanding of the constraints and structure of cognitive control under these circumstances may help to develop procedures to facilitate the employment of cognitive control. In this regard, **Maximilian Stefani** will discuss if and how practice may positively affect cognitive control, by presenting research results of a training study employing a multi-task paradigm. Working memory processing abilities likely represent a constraining factor here. **Elisabeth V. C. Friedrich** will tackle the topic of working memory and present data investigating how interregional neural communication controls workload in working memory processes across different types of memorized information. Besides that, **Sophie-Marie Stasch** will discuss the role of task prioritization in cognitive control demanding conditions, such as steering a helicopter. Hereby, pilots need to resolve the stability-flexibility dilemma, because multiple flight instruments have to be operated simultaneously in a goal-oriented manner despite various distractions. **Yannik Hilla** will pick up on this, and discuss if and how working memory and laboratory multitasking in interaction with media usage preferences may predict military performance. Following this, we intend to open a stimulating round of discussion on the constraints and structure of cognitive control.

Recent Insights on the Basis, Accuracy, and Impact of Metacognitive Judgments

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Research on metacognitive judgments examines what people know about their cognitive processes. The basis, accuracy, and impact of these judgments are crucial for understanding metacognition. This symposium presents recent insights on these topics. The first four talks focus on the basis and accuracy of metacognitive monitoring judgments: Navarro-Baéz, Undorf, and Bröder address whether regularities extracted via statistical learning are used as cues for judgments of learning (JOLs). Bröder, Navarro-Báez, and Undorf present data on the effects of incentives on the accuracy of JOLs. Eberhart and Bryce present evidence on the dependence of metacognitive monitoring on executive functions across development. Schaper and Bayen provide a reanalysis of 17 samples using a Bayesian inference model on the contributions of belief and experience to metamemory judgments about item and source memory. The symposium closes with two talks on the impact of soliciting JOLs: Undorf, Schäfer, and Halamish present an integrative analysis of 17 experiments on the reactive effects of JOLs for related and unrelated word pairs. Following, Schäfer and Undorf provide insights into the role of learning strategies in the reactivity of JOLs for word pairs. Together, the talks present recent insights on the basis, accuracy, and impact of metacognitive judgments.

Retrieval processes in autobiographical remembering

Ryan P. Hackländer[1] & Magdalena Abel[2]
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Memories about personal experiences are integral to our identities, and they additionally serve important social and directive functions. Retrieval of autobiographical memories can be highly emotional, in a positive or negative manner, for individuals across the lifespan. In this symposium, we will focus on current research in autobiographical memory, with a special focus on retrieval of autobiographical memories. Tabea Wolf will discuss how emotion influences the order of retrieval, and Luisa Bogenschütz will focus on how odors influence the experience of autobiographical memories. Trine Sonne will present her research on beliefs about autobiographical memories, with a focus on different groups of professionals whose work may be heavily influenced by their beliefs. Finally, Peter Krøjgaard will discuss potential differences between spontaneous and strategic retrieval of autobiographical memories in children, and Krystian Barzykowski will discuss what mechanisms underly voluntary and involuntary retrieval of autobiographical memories. In addition to the five research talks, the final discussion slot will focus on agreements and disagreements, generalizations, and outlooks for the future of research in this area.

Seeing, Thinking, and Acting in a Physical World

Vivian C. Paulun [1] & Constantin A. Rothkopf [2,3]
[1] *MIT,* [2] *Institute of Psychology, Technical University Darmstadt,* [3] *Centre for Cognitive Science, Technical University of Darmstadt*

Early work (e.g., McCloskey et al 1980) on intuitive physics suggested that humans have pervasive misconceptions about physics, for example about the future motion paths of objects. This is in sharp contrast to our everyday experience: we effortlessly judge the physical properties of objects, their relations, and their dynamics. For example, we estimate the viscosity of a liquid just by watching it flow and we judge the stability of dishes stacked on the kitchen countertop at a glance. Crucially, we can predict possible future states of the world and plan our actions accordingly. For instance, we are able to catch a fly ball even if it hits the ground and starts bouncing up and down. In line with this observation, more recent research has shown that humans have a rich and flexible mental model of the physical world, but perceptual and internal model uncertainties need to be taken into account. Indeed, such models have been able to account for the specific patterns of errors and variability in human judgments about physical scenarios. In this symposium, we argue that perception, cognition, and action are fundamentally grounded in a world governed by the laws of physics. The symposium will examine this hypothesis from multiple angles, covering how our understanding of physics shapes our interpretation of sensory input, how it influences our actions and sensorimotor decisions, and how in turn explorative actions influence our physical judgments.

Self-Processing in the Social Mind: Insights from Behavioral and Neurocognitive Psychology

Jan Pohl
Technische Universität Dresden

The recent renewed interest in studying the concept of "Self" has been facilitated by significant advancements in methodology, such as the development of non-invasive techniques for studying cognition in infants or the increased availability of affordable robots. With researchers from different subfields of psychology the symposium will explore the intricate interplay between social interactions, self-other processing, agency, attribution of selfhood, and their impact on human behavior and cognition.

Kollakowski will begin with early development and discuss the critical role of early social experiences in shaping self-perception. Using a sequential looking preference paradigm with concurrent fNIRS-measurement she will demonstrate "*Behavioral characteristics of the caregiver-child interaction as potential influences on the infant's neural and behavioural processing of self-relevant information*".

Steinmaßl continues in development highlighting the complex nature of self-other boundaries with his talk "*Self-(m)other overlap: the enfacement illusion in middle childhood is present with a stranger but not the mother*". He will demonstrate that 5-6-year-olds display increased self-other overlap in self-face recognition tasks after synchronous stimulation with a stranger, but not with their mother as the other person.

Giersiepen will examine sense of agency as a crucial aspect of one's sense of self in her talk „*Sense of Agency and Reinforcement Learning: Freedom of Choice Increases the Neurophysiological Impact of Affective Action Outcomes*". Presenting two EEG studies, she will highlight the distinct neurophysiological processing of action effects caused by the self, versus another agent.

Pohl will explore the effects of behavioral cues on the attribution of a self to other agents. His evidence reveals "*Attribution of Selfhood based on simple behavioral cues that are linked in a Halo effect like cluster*". By comparing the perception of non-humanoid robots suggesting either the presence or absence of basic behavioral characteristics he shows that demonstrating even a single cue of having a self may be sufficient to trigger a change in overall attribution of selfhood to robots.

Finally, in his *discussion* **Kappas** will contextualize the talks and highlight challenges to and lacunae in our understanding of the self.

Sense of agency in action: The influence of control experience on goal-directed behaviour

Jakob Kaiser
Ludwig-Maximilians-University, Department of General and Experimental Psychology

Sense of agency is the subjective feeling of having control over one's actions or their effects on the environment. Over the last decade, many studies have investigated the sensory and cognitive factors that determine if we experience high or low agency at any given moment. However, much less is known about how sense of agency in turn shapes human cognition and behaviour. Is agency experience epiphenomenal to human behaviour or is it an important determinant of how we perceive and interact with the world? This symposium aims to bring together scientists whose current work sheds light on the influence of subjective agency on goal-directed cognitive processes such as attention, motor control, and learning.

Simon & his friends: New insights into the processing of task-irrelevant information

Pamela Baess
University of Hildesheim

Spatial compatibility effects such as Simon effects are probably one of the most robust effects in cognitive psychology. Spatial compatibility effects show that we cannot ignore task-(ir)relevant spatial information making it a prime candidate for understanding the interactions between perception and action. Throughout this symposium we emphasize that the Simon and Simon-like effects are still valuable tools to bring forward our current understanding of cognitive control.
The first talk will highlight how difficulty of the task-irrelevant stimulus feature modulates multiple Simon effects when a perceptual group of stimuli is presented. The second talk investigates how motor demands influence the Simon effects. In the third talk, the impact of body position on the Simon effect will be addressed. The fourth talk will show how self-related information are embedded into a Simon task and discuss the role of perceived agency in different pathways causing the emergence of the Simon effect. The last talk will address compatibility effects between physical size and space.

Source Memory

Hilal Tanyas & Nikoletta Symeonidou
University of Mannheim

Source memory is a cognitive process concerned with recollecting the contextual aspects of information (i.e., item). This symposium will unite six researchers who will share recent findings derived from a diverse range of research on source memory. First, ***Tanyas***, Kuhlmann, and Erdfelder give a talk entitled "Modeling Latency Processes in Source Monitoring" and present a formal modeling approach integrating response times to the two-high-threshold multinomial processing tree model of source monitoring to estimate the relative speed of memory- and guessing-based processes. Following this, in their project "Do Older Adults Particularly Benefit From Conceptual Emotional Sources? A Replication and Extension of May et al. (2005)", ***Schönung***, Symeonidou, and Kuhlmann aimed at replicating the often-cited finding of May et al. (2005) which suggests that the age-related source memory deficit is reduced or even nullified for emotional sources. Staying within the realm of emotions, ***Symeonidou***, Häußermann, and Klein will give a talk on "The Impact of Negative Mood on Source Memory", differentiating between negative mood with high versus low arousal (i.e., anxiety vs. sadness). Focusing on more applied source memory research, ***Höhs***, Rebholz, and Hütter examine how source memory contributes to proper advice integration with their talk "Who Told You What to Do? The Influence of Source Memory on Advice Taking". Next, ***Hey***, Schaper, and Bayen present their work entitled "Determinants of Source-Credibility Effects in the Continued Influence of Information" and show that a joint encoding of items and sources is critical for the occurrence of source credibility effects on the CIE. Finally, ***Ülker*** and Bodemer give a presentation namely "Applying Multinomial Models to Examine Partner Modelling in Collaborative Learning" and apply source memory paradigms to learning sciences.

Test-enhanced learning

Oliver Kliegl [1] & Bernhard Pastötter [2]
[1] *Regensburg University, Germany,* [2] *Trier University, Germany,*

Research over the past 20 years has shown that tests can be used not only to assess a person's current level of knowledge, but also to improve their learning and memory. For example, tests on previously learned information often enhance later retention (i.e., the backward testing effect) or promote learning of study material encountered afterwards (i.e., the forward testing effect). Even tests administered prior to studying information can have a positive effect on later recall of the information (i.e., the pretesting effect). The goal of this symposium is to present recent findings from various laboratories on the effects of practice testing and to explore the underlying mechanisms. *Shanks & Potts* investigated the utility of initial testing in foreign language vocabulary learning. *Kubik et al*. examined the role of retrieval motivation for the emergence of the forward testing effect in text learning. *Ende et al.* examined the backward testing effect with less complex and more complex study material. *Pastötter & Kliegl* investigated the role of the length of the retention interval for the forward testing effect. Finally, *Kliegl et al.* assessed the pretesting effect under divided attention.

The Impact of Language Experience on Learning and Memory

Tanja Roembke & Matilde Ellen Simonetti
RWTH Aachen University,

Previous research suggests that someone's language experience (e.g., whether they are bilingual or not; how well they know or how long they have known a language; whether two known languages are closely related or not) impacts how new information is acquired and remembered. This can be true for the learning and memory of new linguistic information (e.g., novel words) but also completely unrelated information (e.g., who said what). In this symposium, we explore different ways in which language experience can facilitate or interfere with the acquisition and memory of new information. In this context, contributions will investigate to what extent overlap between prior knowledge and to-be-learned information impacts word learning (Contribution 1) and reading (Contribution 2), whether someone's bilingualism makes them a better overall vocabulary learner (Contribution 3), whether encoding via a native or non-native language influences the nature of object-speaker-associations (Contribution 4), how knowledge accumulation on a trial-by-trial basis differs in an artificial learning task across development (Contribution 5), and whether language switching can impede encoding of new information (Contribution 6).

The intensity of mental effort: Hot news from the body

Guido Gendolla
University of Geneva

This symposium presents new insights in the processes influencing physiological correlates of effort—the mobilizaHon of resources in goal striving—during the performance of different cognitive tasks. Bringing together researchers from four laboratories located in three countries, the contributions highlight the significant roles of different psychologically relevant variables. Michael Richter opens the stage with new experimental research examining sympathetic and parasympathetic nervous system responses at the level of two organs—the heart and the pupil—to changes in the difficulty of a speech-in-noise task. Next, Christopher Mlynski presents experiments manipulating lay beliefs of willpower to alter effort-related cardiovascular responses to a cognitive-control challenge following resource depletion. Kerstin Brinkmann then presents a series of studies showing that individuals' mental effort assessed as cardiovascular reactivity is jointly determined by individual differences in implicit motives and facial emotional expressions embedded in cognitive tasks. Finally, Guido Gendolla discusses recent experiments showing that personal task choice does—in contrast to external task assignment—efficiently shield against implicit affective influences on effortrelated cardiac responses in cognitive tasks with different difficult levels. Taken together, these four contributions advance the understanding of the psychological factors underlying effort exertion during cognitive performance and related adjustments in the human body.

Touch perception: From Unisensory to Multimodal

Didem Katircilar, Knut Drewing
Justus Liebig University Giessen

The sense of touch provides crucial information while interacting with the external world during everyday tasks. For instance, we might try to find fruits with a specific softness during grocery shopping or try to find an object with a specific tactile property like our key from our tightly packed bag. While performing these tasks, information from other sources such as visual and auditory information or prior knowledge supports touch perception. A sound can change roughness perception, visual information can help us to find the correct object by combination with the tactile sense, prior information, e.g. on task demands, can improve touch behavior. This symposium aims to understand how information from different sources interacts with the tactile sense and contributes to touch perception. We will discuss recent findings progressing from unisensory to multimodal perspectives. Paula Soballa will talk about how unisensory and multisensory landmark distortions affect tactile target localization ability. Monica Gori will discuss haptic perception and multisensory integration in typical and blind children by considering active touch and audition. Elena Azanon will address how low-level adaptation aftereffects of tactile distance help us to understand the organization of tactile receptive fields and their relation to object perception. Michaela Jeschke will provide insights on the trade-off between motor effort and perceptual performance regarding termination of haptic exploratory behavior. In the end, Didem Katircilar will discuss mechanisms on how implicit prior information about stimulus softness becomes accessible for the tuning of exploratory behavior.

Towards a Sustainable Experimental Psychology: Theory, Replicability, Behavior

J. Lukas Thürmer [1, 2]

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In the last two decades, psychological science has identified key shortcomings that threaten our scientific progress, sustainability, and trust. Replication failures, lacking theoretical rigor, and over-reliance on self-reports instead of behavior represent fundamental challenges in our field. Typically, these issues are discussed separately, leading to meta-scientific what-about-ism such that proponents of one "camp" propose maximum demands regarding one issue while ignoring the other. In reality, scientific progress needs reliable experiments, grounded in good theory and using informative measures. In this symposium we seek to take such a "multi-pronged approach" by bringing together different perspectives, with a particular focus on how to integrate the rising demands on our science on all fronts. We thereby hope to contribute to renewed debates on how to attain the key goal that we all share: Conducting psychological experiments that help us understand how humans function.

Torsten Martiny-Huenger (The Arctic University of Norway) will provide a categorization logic to differentiate between "good" and "bad" theories in cognitive science.

Juliane Burghardt (Karl Landsteiner University of Health Sciences) will highlight how the maturation of psychological science hinges on paradigmatic research, which necessitates that a discipline agrees on a theory as well as on assessment methods.

Drilling down on the issue of systematic programs of research, Thomas Schultze (Queen's University Belfast) will discuss the importance of standardizing research protocols and measures to further the integration of psychological science.

Lukas Thürmer (University of Salzburg and Private University Seeburg Castle) will elaborate on why the APA's *Decade of Behavior* became a party that nobody went to, why he went anyway, and why (and how) he wants to keep the party going. He will provide a practical example on how to measure behavior online.

Stefanie Mueller (ZPID - Leibniz Institute for Psychology) shifts our focus to tools and approaches that support researchers in conducting rigorous research and provides an overview of how these measures have been endorsed and accepted by the scientific community.

Traffic Psychology I: Human behavior and traffic safety

Mark Vollrath
TU Braunschweig

This symposium examines how different factors influence human behavior in traffic, which might by safety relevant. The first two contributions examine risk factors for crashes from a psychological perspective based on in-depth accident studies. On important risk factor in traffic is driver distraction, which is here examined for cyclists. Especially for this relevant group of vulnerable road users, the design of road infrastructure is a crucial factor for their safety, which is explored with regard to the distance car drivers keep while overtaking. Finally, the influence of driving behavior of future automatic cars on the behavior of human car drivers is examined with regard to a safety-relevant aspect, namely distance keeping while car following. Overall, this symposium provides a broad view on safety relevant aspects of huma behavior in traffic.

Traffic Psychology II: Perceptual aspects

Mark Vollrath
TU Braunschweig

This symposium focuses on perceptual aspects of human behaviour in traffic. In order to behave safely in traffic, perception of the relevant objects, understand their meaning and anticipating their future behavior are relevant aspects, frequently described as situation awareness. The first two contributions focus on understanding the effects of external influences on this kind of perception. Situation awareness is also highly relevant when taking over control from an automatic vehicle. After being engaged in non-driving tasks, the human has to quickly gain a situation awareness allowing a safe take-over of control. It is examined how this can be furthered by visual cues. Finally, the interaction between visual perception and movement is explored in the final contribution comparing different methods. Overall, this symposium focuses on perceptual aspects in relevant topics of current traffic psychology.

Virtual Reality and the Perception of Time

Johanna Bogon & Martin Riemer Johanna Bogon [1] & Martin Riemer [2]
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In recent years, technical developments in virtual reality (VR) applications have been immensely fruitful for the investigation of human time perception, and first frameworks supporting studies in the field have been published. VR as a method enables the use of realistic stimuli, embedded within an immersive, naturalistic context, while maintaining a high level of experimental control over the presented stimuli. VR allows to manipulate external Zeitgeber (e.g., speed of environmental changes) and to control for environmental factors that are known to influence subjective time flow (e.g., spatial size and visual appearance of room interiors). In this symposium, we will present a selection of studies on the perception of time in virtual environments. Along with the presentation of empirical results, the symposium will provide an overview of the advantages and limitations of VR techniques in the context of timing research and address the theoretical implications and implicit assumptions inherent in the methodology itself.

Talks and Posters

Connecting minds: The development of shared memories in social groups

Magdalena Abel
University of Regensburg, Germany

Memories serve a variety of different functions. They speak to our identity and let us remember who we are – they direct our actions today and in the future – and they act as social glue and connect us with the people around us. Reaching socially shared representations of the past can be beneficial for the individual, but also for the collective as a whole. In my presentation, I will discuss recent experimental work on positive and negative effects of social interactions on individual memory, and how these effects may jointly contribute to the development of shared memories in social groups.
Keywords: Memory; social memory; collective memory
Presentation type: Oral presentation / Talk
Session: Collective remembering: Social processes and the representation of public events in human memory

How should a minimal risk maneuver of a highly automated shuttle be communicated to its users via its internal human-machine interface? Applying the media-richness theory to user-centered interface design

Luca Alldinger [1], Thorben Brandt [2], Marc Wilbrink [2], Michael Oehl [2]
[1] *Ulm University,* [2] *Institute of Transportation Systems, German Aerospace Center (DLR)*

In future mobility services using highly automated vehicles on the road (HAV; SAE 4), the lack of a human driver in the vehicle means that users will have no one to communicate directly with in case of problematic situations. Especially, if the HAV has to perform a minimal risk maneuver (MRM), i.e., in case a HAV's capabilities are exceeded, users might experience insecurities. One possible countermeasure could be an internal Human-Machine Interface (iHMI) onboard the shuttle providing information to shuttle users. However, it is still unclear how information should be communicated to users to ensure good user experience during MRMs. This experimental study in virtual reality (VR) uses the media-richness theory to address this issue by providing a multi-layered iHMI consisting of a visual representation of upcoming steps during MRMs accompanied by an avatar surrogating the media richness of face-to-face communication with a shuttle driver. To test the influence of different iHMIs on user experience participants were able to experience three VR-simulated MRMs in an automated shuttle. Using a block-design, participants experienced three versions of the iHMI in each situation. They were either shown solely the visual interface with the problem-solving steps, the visual interface including the avatar's voice, or the visual interface in addition to the avatar including its voice. After each situation, participants were asked to answer several questionnaires regarding their experience. Results provide insights into how the media-richness of iHMIs affects HAV passenger's user experience during MRMs and, therefore, facilitate user adoption of these future mobility services.

Keywords: highly automated shuttles, avatars, internal Human-Machine-Interface, minimal risk maneuver, human-computer interaction
Presentation type: Poster Presentation
Session: Human Factors I

Is there a leftwards bias of emotional attention? A critical analysis of the attentional bias score.

Alexandra Alles, Tímea Folyi, Dirk Wentura
Saarland University, Saarbrücken, Germany

Attentional bias towards emotional visual stimuli is a widely researched field; however, a theoretically important effect concerning attentional preference for emotional stimuli in the left visual hemifield (i.e., assuming a right hemispheric dominance in emotion processing) is still up for debate. A recent eye-tracking study from Gerdes et al. (2021) addressed, among others, the question whether there is an attentional leftwards bias for negative pictures. Specifically, negative and neutral pictures were presented in pairs in a free-viewing paradigm. The effect of picture position was tested on an attentional bias score, a difference value for initial fixations towards negative pictures compared to neutral ones. An enhanced attentional bias score was found for left picture position. However, we argue that the experimental design is missing a critical control condition to interpret this effect in relation to picture valence. Therefore, we conducted a conceptual replication and added a neutral-neutral picture pair condition with a corresponding bias score for arbitrary neutral A- versus B-pictures, to test if the leftwards bias also emerge in conditions where valence of the pictures is invariant. We replicated an overall attentional bias towards negative pictures and an increase of the attentional bias score for negative pictures presented on the left side. However, critically, higher attentional bias score was also demonstrated in the neutral-neutral condition when pictures from the arbitrary A-set were presented in the left visual hemifield. We argue that the experimental design and bias-score demonstrated here should be interpreted with caution regarding an interaction with picture valence.

Keywords: visual attention, emotional pictures, attentional bias, leftwards bias, attentional bias score, eye-tracking
Presentation type: Poster Presentation
Session: Attention

Metacognitive markers of the Prevalence-Induced Concept Change

Artur Ammalainen
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Recent studies have shown that people's concepts can change due to changes in the prevalence of the relevant information in the environment (Levari, 2018), which is called the Prevalence-Induced Concept Change (PICC). According to PICC, decreasing the prevalence of target stimuli (e.g., blue dots) expands the relevant concept. It makes people judge ambiguous stimuli as the target ones (not quite blue dots as blue). The exact cognitive mechanisms underlying PICC remain unknown. We believe that a metacognitive perspective can reveal new insights about them. For example, confidence judgements can reflect the stability and preciseness of the concepts that drive responses, therefore we can expect PICC to be associated with specific dynamics of confidence judgements. If concepts change, the confidence ratings in judgements driven by new concepts should not be different from the previous judgements driven by the old concepts. Considering that new concepts are skewed towards more ambiguous stimuli they should yield a larger amount of erroneous responses. Hence, the confidence judgements driven by new concepts should be less discriminative between correct and incorrect responses (a decrease in *meta d'*). We will test these hypotheses by adding metacognitive measurements to the standard PICC procedure. We will compare confidence ratings for the same stimuli that yield different responses during the first and the last 200 trials. Additionally, we will compare *meta d'* for the first and the last 200 trials. We will define correct responses as the responses that the majority of people gave in the previous experiments on PICC.

Keywords: Concept change, Prevalence-Induced Concept Change, Metacognition, Confidence judgements, PICC
Presentation type: No-Data Poster
Session: Metacognition

An Improved Modeling Approach to Investigate Biases in Human Random Number Generation

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Yousif et al. (2022) proposed a computational model to investigate the processes and biases involved in human random number generation (RNG). Their original two-parameter model includes a repetition parameter and a side-switching parameter representing influences of the immediately preceding number on the choice of the next number. We propose two changes to the model. First, we replace the side-switching parameter with a more general and less task-dependent distance parameter, which accounts for the tendency to select subsequent numbers that tend to be either closer to or further away from the previous number on the selected response pad. Second, we extend the computational model by adding a third parameter to account for the human tendency to select subsequent numbers with greater probability the longer the respective number has not been previously selected, following the pattern of the well-known gambler's fallacy. This new "cycling" parameter takes into account the most recent and all previous selections. The generalized distance parameter, and particularly the new cycling parameter, improved the fit of the model to human-generated sequences and the rate of successful predictions of the next choice from 14.09% to 26.47%, significantly exceeding the expected chance value of 1/9 = 11.1%. Model-driven simulations also showed that the extended three-parameter model could better account for systematic patterns that can be observed in human RNG tasks. The improved model could be useful in many contexts where human biases in RNG tasks are analyzed.

Keywords: human random number generation, fear of repetition, cycling bias, computer simulation, computational modeling, parameter estimation
Presentation type: Poster Presentation
Session: Methods

How to become right when you are wrong

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In today's world of fake news and alternative facts, it is becoming increasingly difficult to tell what is true and what is not. The World Health Organization has identified the overabundance of information, and the rapid spread of (false) information, the infodemic, as one of the most important challenges of our time. Misinformation can often spread unintentionally, leading people to believe something that is not accurate. This research aims to investigate how misleading causal information encountered at different times during an event description affects people's memory of the event. Our first study (N = 50) found a post-event misinformation effect (correct first; incorrect second) with written texts (rather than videos and questions). Unrelated factual information was not affected. In our second study (N = 50), consistent with the continued influence effect, we reversed the order of accurate and misleading causes (incorrect first; correct second). We explored two theoretical accounts: (1) If a recency effect prevails, participants might reject misleading information when later encountering accurate information, and (2) if memory updating plays a greater role, participants might tend to integrate and maintain misleading information into their mental model. Our research stresses the importance of understanding the interplay between recency and memory updating, providing valuable insights into the dynamics of misleading information on memory.
Keywords: misinformation effect, memory
Presentation type: Oral presentation / Talk
Session: Misinformation

The Implicit Measurement of Situation Awareness Based on Compatibility Effects: Evidence from Teleoperated Grasping

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Situation awareness (SA) is one of the defining constructs of the 21st century in Engineering Psychology. SA, concisely defined as current understanding of a dynamic situation, is considered important to the process of decision-making in several domains such as aviation, road transport, military operations, or human-robot interaction. Accordingly, a plethora of measurement approaches towards SA has been developed, including process measures, performance measures, subjective measures and objective measures. The most frequently used approaches for SA measurement are the objective ones, which typically rely on explicit query-probe techniques. Yet, these explicit measures do not account for the implicit processes contributing to the acquisition of SA, and thus also for the related product, an internal mental representation of the situation. To address this gap, an objective measurement approach based on implicit queries has been derived, querying operators to respond with an action that is either compatible or incompatible with adequate SA of the current situation. Results from the experimental validation of this measurement approach in a teleoperated grasping scenario are presented and discussed, and implications for future research are derived.
Keywords: Situation awareness, measurement, compatibility effect, priming.
Presentation type: Oral presentation / Talk
Session: Experimental Engineering Psychology and Human Factors I

Personalized, Adaptive, and Inclusive Retrieval Practice: Taking Neurodivergence and Individual Choice Into Account in Digital Assessment and Learning Environments

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As digital assessment and learning environments become increasingly prevalent in education, it is crucial that they meet the needs of neurodivergent and low-performing students. Maximizing the achievement of all students requires a personalized, adaptive, and inclusive environment. In addition to machine-driven personalization, learner-driven personalization through choice has a potential to enhance learner performance, engagement, and motivation (Brod et al., 2023). Although empirical studies have shown that choice can improve learning outcomes (Patall et al., 2017), memory retention (Murty et al., 2015), and learner engagement and motivation (Patall, 2013), the boundary conditions of learner choice are unclear, particularly among neurodivergent and low-performing students.

In this talk, we first discuss how we can give learners more control over their digital learning experience (e.g., the user interface, input methods, adaptivity, lesson content, and automated recommendations). Subsequently, we present our empirical design to test the effectiveness of these changes in a real-world classroom setting.

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Keywords: personalized learning, agency, adaptive retrieval practice, testing, equity, motivation, engagement
Presentation type: Oral presentation / Talk
Session: Adaptive Retrieval Practice and its Applications in Education and Health

Forgetting the Locations of Objects: Intentional Forgetting in Spatial Memory

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Previous work has shown that people can intentionally forget information when they are cued to do so. Such directed forgetting has extensively been demonstrated with verbal information, but has rarely been investigated with spatial information. The present study therefore examined directed-forgetting effects in object location memory. Participants studied two successively presented 3×3 arrays, each composed of the same nine objects. The instruction was to memorize the locations of the objects which differed between the two arrays. Following presentation of the first array, participants received a cue to either forget or continue remembering the object locations of this array before studying the object locations of the second array. After a brief retention interval, object location memory for both arrays was tested. Results revealed that forget-cued participants showed impaired location memory for Array 1 and enhanced location memory for Array 2, relative to remember-cued participants. Notably, whereas the impairment effect was found regardless of whether Array 1 was tested before or after Array 2, the enhancement effect was found only when Array 2 was tested first. These findings suggest that people can exert control over their memories, being able to intentionally forget not only verbal information, but also spatial information. The results are discussed in terms of both inhibitory and non-inhibitory accounts of directed forgetting.

Keywords: Episodic Memory; Intentional Forgetting; Directed Forgetting; Object Location Memory; Spatial Memory; Inhibition
Presentation type: Poster Presentation
Session: Memory and Learning I

Mental Rotation Ability and Motor Skills in Early Childhood

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Mental rotation (MR) is crucial for object recognition and visuo-spatial prediction. Recent studies suggest a strong interplay between mental rotation and motor abilities during infancy (e.g., Schwarzer et al., 2022). While the development of mental rotation has been studied between the ages of 3 to 6 (Frick et al., 2013), limited research has explored the relationship between this ability and locomotion within this age group. To address this research gap, our ongoing study with 4 to 6-year-olds aims to understand the development of the relationship between motor skills and mental rotation beyond infancy.

To assess mental rotation abilities, we developed a novel MR Block task that consisted of two Shepard-Metzler objects (mirrored to each other) and two 3D boxes with corresponding cut-outs of the objects. The task involves presenting the two objects in different orientations (along X or Y axes) and various rotation angles (0 to 180 degrees), and one 3D box in which only one of the objects fits. Each child is asked (i) to point at the object that would fit into the box (perception) and (ii) to grasp and fit the object into the box (action). Motor skills are assessed using LoMo (Jascenoka & Petermann, 2018).

Preliminary data suggest that 6-year-olds exhibit greater accuracy in total responses for both parts of the MR task compared to 4-year-olds ($t(31)=-2.593$, $p<0.05$). There appears to be a positive correlation ($r=0.492$, $p=0.105$) between motor skills and the perception part of the MR task in older children, highlighting their interdependence beyond infancy.

Keywords: Mental Rotation, Motor Skills, Development, Early childhood, Visuo-spatial Prediction
Presentation type: Oral presentation / Talk
Session: Perceptual Learning

Influence of Physical Effort on Cognitive Offloading

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Cognitive Offloading - defined as the use of external resources to minimize cognitive demand - is used during the time age of advancing technology as a common way to solve problems. However, using external resources to reduce cognitive load always implies an additional action and therefore physical effort to execute it. How physical effort influences the decision process of selecting one strategy is not yet understood. Through Mouse Tracking and common dependent variables a deeper understanding of this strategy selection process is accomplished. An extension of the mental rotation paradigm was used. It allowed participants to rotate stimuli either internally or by manually clicking on a button on the computer screen that afforded rotating stimuli externally on the screen. Three parameters were manipulated: The angle at which the stimulus was presented, the presentation format and the speed with which a manually rotated stimulus could be turned.
Participants used cognitive offloading more often, when the presentation angle approached 180° and when the stimuli were mirrored. Against our predictions, the rotation speed did not influence the amount of offloading. This seems to be a result of an unintuitive use of the mouse. For either solving the task and rotating the stimuli the mouse had to be used with varying mapping of the left and right mouse button.
The paradigm seems to be a considerable way of investigating the effects of physical effort on cognitive offloading. However physical effort should be operationalized more realistically, and the design needs to altered to minimize confounds.

Keywords: Cognitive Offloading, Physical Effort, Cognitive Effort, Trade-Off
Presentation type: Poster Presentation
Session: Human Factors I

Grain of Events Shape Modality of Their Representations: Fine Context Triggers Modal Representations

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Event cognition theories suggest that the structure of events is hierarchically organized. While working event models process sensory (modal) information, more abstract (amodal) information is processed at higher-level event models in long-term memory. Studies also show that event descriptions become more abstract when the grain of the event shifts from fine context (e.g., "breakfast") to coarse context (e.g., "morning routine"). However, it is an open question when (and how) this abstraction occurs and when event models become amodal. Our preregistered experiment tested the influence of context grain and presentation modality on the nature of event models. We presented participants (N = 88) with fine or coarse events in either text or video format. Their task was to decide, as fast as possible, if the following video stimulus (target or distractor) fits the event presented before. Reaction times to hits were used as the dependent variable. Results showed a main effect of context grain. Participants responded faster to fine events than to coarse events. The main effect of modality was also significant, with participants responding faster when the target modality was video (compared to text). Further, we observed no interaction. These results suggest that (1) the fine context triggers modal representations of events, (2) the coarse context (as realized in the present experiment) does not lead to more amodal representations, and (3) that viewers benefit from a match in context modality. We discuss the results in the context of present event cognition theories.

Keywords: modality, modal, amodal, event cognition, context grain, memory
Presentation type: Poster Presentation
Session: Memory and Learning III

Adaptation aftereffects and the coding of tactile distance

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Adaptation aftereffects can reveal how different dimensions of stimuli are selectively processed by populations of neurons. In a series of behavioral experiments, we harnessed these aftereffects to gain insights into the representation of tactile distance. Pairs of pointed tactile stimuli separated by particular distances were applied either on the hand, or on the fingers. We subsequently tested the magnitude and gradient of adaptation aftereffects across adjacent skin regions to the adapted one. In addition, we conducted electrophysiological recordings to assess the impact of adaptation to a particular distance following prior adaptation to either a large or small distance. Our findings indicate that the distance between two distinct tactile events on the skin is susceptible to adaptation. Additionally, the transfer of adaptation aftereffects showed a very specific pattern, extending to adjacent areas of the hand and finger but not across fingers, palm and dorsum, or finger and hand. Notably, early electrophysiological differences emerged in response to a given distance, when preceding adapting stimuli were either large or small. These results support the notion that the computation of distance in touch begins at early stages of somatosensory processing. Furthermore, the distinctive pattern of aftereffects across adjacent areas could potentially provide a psychophysical insight into the organization and overlap of tactile receptive fields, particularly concerning anatomical and functional boundaries between different body parts.

Keywords: tactile distance, adaptation aftereffects, receptive fields, electrophysiology
Presentation type: Oral presentation / Talk
Session: Touch perception: From Unisensory to Multimodal

Evidence for an evaluative effect of stimulus co-occurrence may be inflated by evaluative differences between assimilative and contrastive relations

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Recent research on relational evaluative conditioning (relational EC) suggests that stimulus co-occurrence can have a direct effect on evaluations over and above the particular relation between the co-occurring stimuli. This research is based on a process dissociation approach where co-occurrence effects are demonstrated via attenuated evaluative learning for co-occurring stimuli that are connected by contrastive in comparison to assimilative relations. Instead of attributing such attenuations to an orthogonal influence of stimulus co-occurrence, we investigated whether (a) contrastive relations tend to produce weaker evaluations than their assimilative counterparts and (b) such evaluative differences can inflate evidence for co-occurrence effects on continuous as well as on categorical evaluation measures. A pilot study (N = 85) confirmed notion (a), while a first experiment (N = 42) produced preliminary evidence for notion (b) in the context of multinomial processing tree modeling. We report results from a second, high-powered experiment (N = 252) designed to produce conclusive evidence for the idea that evidence for co-occurrence effects can be inflated by evaluative differences between assimilative vs. contrastive relations.
Keywords: evaluative conditioning, relational evaluative conditioning, dual-process theories
Presentation type: Oral presentation / Talk
Session: Current Developments in Evaluative Conditioning: Methodologies, Mechanisms, and Manifestations

Simon is difficult – How difficulty modulates multiple Simon effects in a perceptual set

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In recent years, the Simon effect has been intensively studied using multiple stimulus locations along the horizontal or vertical axis of the screen's center. We recently implemented a version of the Simon task in which a single stimulus setup was compared to a multiple stimulus setup containing a perceptual set of identical stick-figure manikin stimuli. With this paradigm, we typically observe two kinds of Simon effects, i.e. one along a global reference frame (based on the screen's side) and local reference frame (based on the side of manikin stimulus). In the present set of experiments, we investigated the role of task difficulty on the emergence of both Simon effects when a perceptual set of identical manikin stimuli was used. In Experiment 1, the influence of the perceptual distribution and clarity within the set of identical manikins was investigated. Experiment 2 addressed the difficulty of the task-relevant stimulus feature in the Simon task (i.e. color vs. shape classification). Taken together, the results show that both kinds of Simon effects are differently modulated by the different experimental manipulations of difficulty.
Keywords: Simon effect, cognitive conflict, spatial reference frame, perceptual Gestalt
Presentation type: Oral presentation / Talk
Session: Simon and his friends: New insights into the processing of task-irrelevant information

Marked interactions improve learning outcomes of primary school children despite individual differences in executive attention

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Interactions embedded in educational apps enhance learning by accompanying the learning material with relevant physical activities. They, however, can be cognitively demanding as children often have to search for them on the screen, which takes up additional cognitive capacity. This might be particularly demanding for children with less developed executive attentional skills as they are more distractible. Marking the location of interactions on the screen may help to free up cognitive capacity and, consequently, increase the benefit of interactions. To test this, we studied the recall performance of primary school children (N=46; M=9.36yrs) after storybook exposure. Children were randomly assigned into four groups. In the marked interactive group, children viewed an interactive storybook application where interactions were marked with an icon. The non-marked interactive group was identical except that the interactions were not marked. In the multimedia group, children watched a video of the application, while in the control group, we presented static illustrations from the app with narration. Immediately after the exposure, we assessed children's recall performance with open-ended questions and measured their executive attentional skill. Compared to the control group multimedia elements and marked interactions improved recall performance regardless of the executive attentional skills of the children, however when using non-marked interactions children with less advanced executive attentional skills scored lower on the open-ended questions. These results suggest that marking the location of interactions frees up cognitive capacity by automatically orienting attention. This makes interactions beneficial even for at-risk children.

Keywords: educational application, educational psychology, executive attention, interactive features, memory encoding

Presentation type: Poster Presentation

Session: Human Factors I

Scene semantic effects on allocentric coding in naturalistic (virtual) environments

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Interacting with objects in our surroundings involves object perception and object location coding, the latter of which can be accomplished egocentrically (i.e., relative to the self) and/or allocentrically (i.e., relative to other objects). Allocentric coding for actions under more naturalistic scenarios can be influenced by multiple factors, (e.g., task relevance). Within the hierarchy of scene grammar, the semantic relationship of local objects (small/moveable) can strengthen allocentric coding (i.e., stronger effects for local objects of the same vs. different object categories). Currently, it is unknown how the next level of the scene grammar hierarchy, i.e., anchor objects (large/stationary), modulates this process, since they tend to predict the identity and location of surrounding local objects. Here, we investigated the effect of semantically congruent versus incongruent anchors on allocentric coding of local objects within two scene types (kitchen, bathroom). In a virtual environment, three local objects were presented on a shelf connecting two anchors (semantically congruent or incongruent with the local objects). After a brief mask and delay, the scene was presented again without the local objects and one of the anchor objects shifted (leftward or rightward) or not shifted. Then, participants grabbed the presented local object target and placed it in its remembered location on the empty shelf. These findings show systematic placement errors in the direction of the anchor shift, with no influence of semantic congruency. Our results suggest that, even if task-irrelevant, anchors play an important role in allocentric coding of local objects in naturalistic, virtual environments for action.

Keywords: spatial coding, object perception, scene perception, scene semantics, virtual reality
Presentation type: Oral presentation / Talk
Session: Egocentric and allocentric reference frames: Integrating across measures, task complexity, and spatial scales

How does early motor system development promote spatial navigation? An infant MRI study

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Motor development has profound consequences on perception in infants, including action understanding, mental rotation and proprioception around the first birthday. First evidence shows that motor development around the age when infants start walking, has effects on their spatial memory. However, the neural correlates on this developmental change around the end of first year have not yet been investigated.

The present study combines motor development tasks, MRI assessment and a behavioral spatial navigational task to address this knowledge gap. Fine and gross motor capacities were tested at 12 months of age (N=30) using age-specific tasks from Bayley's III scale. Spatial navigation was tested with a "hide-n-seek" task inspired by the Morris water maze. In a separate MRI session at 13 months, T1 images of infant brain were collected to measure volumes of specific regions of interest, namely, primary motor areas, premotor areas, supplementary motor areas, anterior hippocampus and parieto-insular vestibular cortex.

I will present results with regards to the hypothesis that motor capacities of infants at 12 months affect their spatial navigational abilities and that this effect is mediated by increased volumes in brain regions associated with spatial navigation.

This study will be the first to investigate a link between infants' motor skills and early spatial navigation and provide a better understanding of the neural underpinnings of motor developmental milestones and its consequences on the domain of spatial cognition. This study thus further contributes to a deeper comprehension of how motor milestones shape cognitive development during infancy.

Keywords: motor development, spatial navigation, brain development
Presentation type: Oral presentation / Talk
Session: Motor Development and Cognition

Effects of task difficulty on visual processing capacity and its distribution

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When monitoring attentional parameters for gradual changes over the course of an experiment, we strive for quick and precise estimations in small time intervals. The long-standing question on how to reduce the number of necessary trials for a sufficiently accurate parameter estimation, driven by economic reasons or by the desire to design the experiment to be less taxing for participants, has produced quite a few adaptive methods that involve reducing the probed stimulus levels of individuals in a task and hence, increasing the overall task difficulty. Progressively narrowing the set of stimulus levels, e.g., by removing higher stimulus onset asynchrony levels from a temporal-order judgment task, leads to accurate parameters estimates if inter-trial effects due to stimulus-level changes are assumed to be non-existent or non-confounding. There are findings about higher arousal with an accompanied better performance when participants encounter tasks with higher difficulty. These effects may not matter for finding absolute perceptual thresholds. However, in experiments where the psychophysical task is used to measure the effect of an intervention which itself may be difficult to process, performance changes due to higher task difficulty of the adaptive measure is a confounding variable. With a model based on the Theory of Visual Attention (TVA), we evaluate how increased difficulty of the spatial temporal-order judgment task affects visual attentional capacity and its distribution. Considering the results, we discuss the practical implications for experiments in which a limited number of trials are available for probing.

Keywords: TVA, visual attention, task difficulty
Presentation type: Poster Presentation
Session: Attention

How early social interactions shape infants' visual attention and perception processes

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In the first year of life, infants show a significant development in their ability to selectively attend to objects in the environment, with crucial consequences for early cognitive functioning. Social interactions influence infants' attention: When looking at novel objects, infants' neural responses increase following eye contact with an adult. In a series of studies, we investigated how early social interactions shape 12-month-old infants' neural dynamics when attending to objects in different cultures and in dynamic social exchanges. For this, we used the methodological approach of rhythmic visual stimulation (RVS) combined with electroencephalography (EEG). In a first, cross-cultural study conducted in Austria and Japan, we found that infants' visual attention style (i.e., analytic/holistic) and associated neural responses to objects as compared to image background were influenced by culture during early interactions. Already at 12 months of age, Austrian infants focused mainly on the objects, whereas Japanese infants also paid attention to the background. In a subsequent follow-up study, we are currently testing if infants' visual attention style can be altered by differential attention guidance. In a third study using dual-EEG to measure infants' and mothers' brain activity simultaneously, we show that early interactions accompanied with social cues such as eye contact, infant-directed speech, and pointing promote infants' and mothers' neural responses when jointly attending to objects, thus facilitating visual processing. Our project highlights the role of early interactions in the development of attention allocation and visual perception in infancy and promotes the advantages of the RVS method in developmental neuroscience.

Keywords: communicative cues, early social interactions, frequency tagging, infancy, joint attention, steady-state visually
evoked potentials, visual perception
Presentation type: Oral presentation / Talk
Session: Advances in Developmental Cognitive Neuroscience

Similarity and Consistency in Algorithm-Guided Exploration

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Human decisions in exploration scenarios can be enhanced by providing them algorithm advice. However, algorithm advice can only be beneficial, if humans are willing to follow the advice. In an online experiment, we studied in how far the willingness of participants to follow the advice of a (real) reinforcement learning algorithm depends on the relation of their own exploration preferences and the advising algorithm's exploration preference. Participants played a ten-armed bandit task with and without algorithm advice. We varied the weight that the algorithm places on exploration rather than exploitation, and modeled the participants' decision-making processes using a learning model comparable to the algorithm's. We find that the algorithm's advice affects and improves participants' choices in all treatments. However, participants are much more likely to follow an algorithm that is more exploitative than they are themselves, while we do not find evidence that the similarity between human choices and the algorithm's recommendations does not increase humans' willingness to follow the recommendations. Possible explanations for the found preference for exploitative algorithms are that participants either perceive the consistency over time of the exploitative algorithm as a signal of expertise or that participants perceive myopically small rewards obtained when exploring new options as errors.

Keywords: Decision Making, Algorithm, Artificial Intelligence, Exploration Exploitation, Modelling, Similarity

Presentation type: Oral presentation / Talk

Session: Decision Making II

Extended pretesting can boost memory performance

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Regensburg University

Performing a pretest (plate - ?) before studying the material to be learned (plate - fork) can improve long-term retention of the material compared to material that was only studied initially. In the present study, weakly associated word pairs were used to investigate whether this pretest effect is modulated in magnitude when pretests are repeatedly administered during acquisition. To this end, two experiments were conducted in which subjects were presented with word pairs that could either be studied immediately or were given up to three pretests. Recall performance on a later final test consistently showed the typical pretesting effect, with improved recall after a single guessing attempt compared to the study-only baseline. Crucially, the pretesting effect increased in size when multiple guessing attempts were made during acquisition, irrespective of whether the length of the pretesting phase increased with the number of guessing attempts (Experiment 1) or was held constant (Experiment 2). Overall, the results show that additional guessing attempts can promote access to the pretested material on the final test, indicating that in educational contexts, extended pretests during learning may provide an effective learning tool.

Keywords:
Presentation type: Poster Presentation
Session: Memory and Learning III

Balancing Act: Examining Implicit and Explicit Modulators of Cognitive Stability and Flexibility

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Some situations demand focus, others flexibility. Our cognitive system can adapt to such dynamic demands by adjusting cognitive control to optimize information processing. Specifically, cognitive stability and flexibility are conceived as complementary control modes that facilitate either the shielding or shifting of internal goals. The adaptive regulation of control modes is moderated by various factors, including reinforcement learning. However, whether reinforcing stable or flexible behavior itself can modulate cognitive control modes remains an open question. Previously, we showed that cognitive control can be modulated via explicit instructions in a lab-based experiment. Here, we present a planned online study employing a task-switching paradigm to examine implicit and explicit modulators of cognitive control along with first pilot data. We will investigate whether stability and flexibility can be modulated via reinforcement learning by making reward contingent on stable or flexible behavior, and whether potential implicit learning effects increase over time (Experiment 1). Furthermore, we aim to replicate the finding of volitional cognitive control adjustments by instructing participants to perform the task in a more stable or flexible manner (Experiment 2). We will further test for an antagonistic relationship between cognitive stability and flexibility, contributing to the ongoing debate on whether stability and flexibility incur complementary costs and benefits or are regulated independently. Adjustments in stability and flexibility, indicated by changes in interference costs and switch costs, will be analyzed using Bayesian generalized linear mixed models. Thus, this study aims to enhance the understanding of factors modulating the meta-control of cognitive stability and flexibility.

Keywords: cognitive control, stability-flexibility dilemma, meta-control, task switching.
Presentation type: Poster Presentation
Session: Cognitive Control and Conflict II

Investigating cognitive mechanisms of involuntary and voluntary remembering the personal past

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Autobiographical memory is the ability to remember and recall our personal past. We typically use this type of memory voluntarily when, for example, trying to recall if we have paid the bills or the last time we went on holiday to the seashore. Nonetheless, autobiographical memories may also pop into our mind unintended, for example, when the taste of a certain cake at a café reminds us of our 40th birthday party. The goal of the talk is to use the perspective of experimental cognitive psychology and present a series of studies aimed at understanding the way(s) in which such personal past is remembered and retrieved. More specifically, during the talk I will present: (1) the context of studies on the involuntary and voluntary autobiographical memories, (2) the dimensional approach to autobiographical memory retrieval, and (3) the most important directions for further research.
Keywords: autobiographical memory, involuntary cognition, memory retrieval, involuntary memories
Presentation type: Oral presentation / Talk
Session: Retrieval processes in autobiographical remembering

Investigating the role of working memory in the occurrence of involuntary past and future thoughts

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Across two experiments, we tested the hypotheses that the frequency of IAMs (involuntary autobiographical memories) and IFTs (involuntary future thoughts) may be reduced due to (1) the limited working memory capacity that enables the processing of only a finite number of thoughts and/or (2) the reduced likelihood of noticing incidental, task-irrelevant cues that may potentially trigger IAMs and IFTs. To this end, participants completed a laboratory vigilance task with irrelevant cue-words to trigger IAMs and IFTs, and random thought-probes to measure their frequency. Study 1 (240 participants) manipulated the level of working memory load (none, low, high) while participants performed a letter version of the N-back. The presentation of working memory task-items and incidental cue-words in the vigilance task was also manipulated (simultaneous vs. sequential). Study 2 (240 participants) further manipulated the type of working memory load by using either verbal or visuo-spatial N-back task. In both studies, to further examine levels of incidental cue-noticing, participants also completed an unexpected cue-recognition task after completing the vigilance task.
Keywords: autobiographical memory, involuntary memory, working memory
Presentation type: Poster Presentation
Session: Memory and Learning III

Violations of Visual Regularities Induce Pupil Dilation Responses

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Humans build internal models of the environment to make predictions. For example, after a regular pattern of auditory tones has been presented, phasic arousal and pupil dilation responses (PDRs) are induced when the regularity is then violated. This suggests that an internal model of the regularity is first constructed and then reset. In contrast, the emergence of a regular pattern from a random pattern does not elicit these responses. These findings have been extensively studied for the case of auditory patterns (Zhao et al., Nature Communications, 2019; Basgol, Psychonomics-conference, 2022). Here, we investigated whether they generalize to spatiotemporal visual patterns. We presented regular or random patterns of white dots appearing at different locations on a grid. We used (a) transitions from a regular pattern to a random or another regular pattern (both violating the earlier regularity) or (b) transitions from a random to a regular pattern (such that a regularity emerges). Participants (N=14) were instructed to find blanks in the patterns to keep their attention. Similar to auditory patterns, violations of visual regularities evoked PDRs (albeit with smaller magnitudes), while the emergence of a regularity did not evoke PDRs. Our findings suggest that violations of visual regularities, but not their emergence, lead to arousal and PDRs— just as for auditory regularities.

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Keywords: Visual regularity violations, internal models, pupil dilation responses, arousal
Presentation type: Poster Presentation
Session: Perception III

The effect of a negative social encounter on finding and inhibiting emotional expressions in a visual search task by the same individual

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Attentional biases in social anxiety are widely researched with avoidance of negative facial expressions frequently reported. However, there is a limited amount of research focusing on attentional biases regarding individuals we had a negative interaction with. We aimed to find out how previous social exclusion the ability to find and inhibit different emotional expressions displayed by the excluding person, and how social anxiety influences this.
Participants (N=52) first completed a visual search task searching for various emotional expressions (happy, angry, fearful, or disgusted) among neutral faces. Then, they played a game of Cyberball in two different conditions: Control – the players made the same number of throws to the participant and each other, and Exclusion – one player excluded the participant. After the Cyberball game, participants repeated the visual search task. The familiar players from the game appeared either as targets or as distractors.
Participants found angry faces slower compared to happy, fearful and disgusted faces. Further, when comparing the pre- and post-game RTs, anxiety did not have an effect in the Control condition, while in the Exclusion condition, non-anxious individuals reacted faster compared to anxious individuals. This effect appeared both when the excluder was the target and the distractor. Our results support that angry faces are subject to an attentional avoidance. Furthermore, non-anxious individuals become more vigilant to emotional social cues after being excluded, while socially anxious individuals avoid the person that excluded them. Future studies need to confirm this using an eye-tracker.
Keywords: social anxiety, visual search, emotion, emotional expression, attentional bias
Presentation type: Poster Presentation
Session: Clinical and Biological Psychology

Disentangling the contributions of declarative and procedural rule representations during instruction-based learning

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The human ability to fast and efficiently learn via instructions is remarkable. Initially encoded as declarative stimulus-response (S-R) rules, instructions need to be converted into a procedural format for successful execution. At the stage of rule implementation, it is usually difficult to disentangle these two levels of rule representation. We compared direct instructions ('if Stimulus A, press Key T') to indirect instructions ('if Stimulus B, do not press Key T but another Key') to explore whether this approach could be a valuable means to achieve distinct measures of declarative and procedural representations, respectively. To this end, following these different instruction types, we assessed behavioral performance during repeated direct rule implementation as well as during a subsequent rule recognition test. We found that compared to direct instructions implementation response time (RT) was significantly longer on indirectly instructed rules at all repetitions. Furthermore, a positive correlation between implementation RT and rule recognition accuracy was only observed on indirectly instructed rules, which suggests the continued importance of the instruction-related declarative representation for that instruction type. At the same time and at constant error rates, the tendency to alternate between response options (i.e., switch probability) was decreasing over repetitions for indirectly but not for directly instructed rules, indicating the emergence of an implementation-related procedural rule. Importantly, S-R rule identities at the declarative and procedural level differ for indirectly instructed rules but not for directly instructed ones. Therefore, our results indeed provide a basis for distinguishing between representation types, potentially also at the neural level.

Keywords: instructions, S-R rules, rule representation
Presentation type: Poster Presentation
Session: Cognitive Control and Conflict I

Dessert in Philadelphia, pudding in Regensburg? Investigating the relation of abstraction level and distance in a sentence completion task

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A longstanding debate in cognitive psychology concerns whether information is represented in an abstract/amodal or a concrete/modal format. Recently, this dualism has been increasingly abandoned in favor of a more flexible view, where different representational formats can co-exist and serve specific cognitive functions (see Kaup et al., 2023). For example, Construal Level Theory suggests that objects or events are represented more abstractly when more distant from the self, whether in spatial, temporal, or social terms (Trope & Liberman, 2010). In two online studies, we investigated whether this association of abstraction and distance can be observed in language comprehension. We presented participants with incomplete sentences that either specified a near or distant location ("In Regensburg/Philadelphia, the man eats …") or an object described on a lower or higher category level ("The man eats pudding/dessert in …"). Participants were asked to complete a single sentence beginning with one of two possible endings (forced-choice, Exp. 1) or to match two possible endings to two sentence beginnings (matching task, Exp. 2). In addition, to investigate the role of social distance, sentences were formulated in either third-person or self-perspective. We observed a reliable association between category level and spatial distance in the matching but not the forced-choice task, presumably because the matching task provides a reference frame to interpret the relative distances and category levels. As first- compared to third-person perspective did not increase the strength of this association, we suggest that social distance is not a strong determinant of abstraction level in this task.

Keywords: mental representation, abstraction, distance, thinking, conceptual knowledge, language
Presentation type: Poster Presentation
Session: Memory and Learning II

Filtering mechanisms in early visual cortex modulate the occurrence of task-irrelevant visual perceptual learning

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Perceptual learning (PL) of visual features depends on their relevance to a given task. Previous results showed that PL occurs for task-irrelevant features that are near detection threshold but not for task-irrelevant features that are above detection threshold (suprathreshold). Neuronal mechanisms modulating the occurrence of task-irrelevant PL remain largely unknown and are focus of the current research. We employed a design in which participants (n=24) trained on a rapid-serial-visual-presentation task at screen center while being exposed to coherent motion in the visual periphery as a task-irrelevant feature over the course of twelve daily sessions. Before the first, after the sixth, and after the final session, participants performed the task while brain activation was measured in an MRI scanner. Participants were assigned to one of two exposure conditions, which differed only in the salience of the exposed task-irrelevant feature (coherent motion near detection threshold or suprathreshold). The behavioral results showed that task-irrelevant PL occurred in the near threshold but not in the suprathreshold exposure condition. Task-irrelevant PL in the near-threshold condition was associated with increased activation in early visual cortex representing the task-irrelevant coherent motion in the visual periphery. In contrast, activation in early visual cortex during suprathreshold exposure was suppressed. These results indicate that neuronal mechanisms at the earliest stage of cortical visual processing are involved in filtering perceptually salient (suprathreshold) task-irrelevant features. However, such filtering mechanisms fail for perceptually weak (near threshold) features, leading to the occurrence of task-irrelevant learning.

Keywords: Early visual cortex, Feature Salience, Filtering, Plasticity, Task-irrelevant, Visual Perceptual Learning
Presentation type: Oral presentation / Talk
Session: Perceptual Learning

An agent's reputation and skill affect self-reported trust differently from behavioral trust.

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Through continuing automation, the systems people work with are becoming increasingly agentic. In these human-agent teams, the system is no longer a tool to be used but rather a partner with agency. These changing roles create the challenge of how much trust human users should place in such agentic systems. Since over- and under-trust are associated with costs, the trust one puts into an agentic partner must be finely calibrated. To accurately calibrate their trust, the user must use all available information, such as the agent's reputation and task performance.
In our experiment, the participants interacted with an agent in a cooperative puzzle game similar to Tetris. The players could select one among four pieces and place it without time pressure. We manipulated the agent's reputation and skill and measured the participant's trust in the agent using self-report and behavioral measures. Self-reports were measured immediately after reading the reputation text and again after experiencing the agent. As a behavioral measure of trust during the interaction with the agent, we used trials in which the participants delegated the choice of a piece to it.
Results show that trust initially reflects the agent's reputation, but it is immediately canceled out at the start of the interaction, depending on the agent's skill level. During and following the experiment, no effect of reputation is detectable anymore. The team's cooperative task performance depended on the agents' and the participants' abilities. Additionally, the participant's performance moderates the effect of the agent's skill in post-interaction trust.
Keywords: trust, reputation, performance, human-agent-interaction, game, multi-method
Presentation type: Oral presentation / Talk
Session: Artificial Intelligence

Body cognitions in phantom limb pain

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Phantom limb pain (PLP) remains a puzzling condition, both for researchers and clinicians. Previous findings suggest a relationship between neuroplastic alterations of central body representations, cognitions related to the own body, and PLP, indicative of a common psychophysiological basis.1 In the present talk, I will give an overview of the current knowledge on this topic, with emphasis on my group's very recent results on (disturbed) body perception after limb amputation. To that end, I will focus on prosthesis-related body cognitions2 and its relationship to PLP. 3 Based on these insights, I will develop theoretical considerations about how disturbed body perceptions may contribute to the maintenance of PLP. This psychophysiological framework can help identifying promising therapeutic targets for mechanistically-informed non-pharmacological treatments.

1 Rothgangel, A., & Bekrater-Bodmann, R. (2019). Mirror therapy versus augmented/virtual reality applications: towards a tailored mechanism-based treatment for phantom limb pain. Pain Management, 9(2), 151-159.
2 Bekrater-Bodmann, R., Reinhard, I., Diers, M., Fuchs, X., & Flor, H. (2021). Relationship of prosthesis ownership and phantom limb pain: results of a survey in 2383 limb amputees. Pain, 162(2), 630-640.
3 Bekrater-Bodmann, R. (2020). Perceptual correlates of successful body–prosthesis interaction in lower limb amputees: psychometric characterisation and development of the Prosthesis Embodiment Scale. Scientific Reports, 10(1), 14203.
Keywords: pain, phantom limb pain, neuropathic pain, body perception, treatment
Presentation type: Oral presentation / Talk
Session: Psychological factors in chronic pain: Recent experimental results

Does processing metaphorical expressions yield long-lasting priming of meaning facets? Evidence from free association

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Contextual constraints can prime meaning facets of words for up to 30 minutes (Curtis et al., 2022). We tested whether metaphorical expressions prime meaning facets in a similar fashion. To this end, we compiled pairs of a target word with metaphorical and non-metaphorical source words (money – universal remedy vs. money – means of payment) and embedded them in parallelized versions of a scripted story. In each version, half of the targets were combined with a metaphorical source word and the other with a non-metaphorical one. Targets appearing with a metaphorical source word in one version were combined with a non-metaphorical one in the other and vice versa. Participants first listened to one of the story versions, completing comprehension questions throughout. In a free association task administered immediately after or with 10 minutes delay, participants' self-rated associations to target words presented in a metaphorical context in the story were more similar to the metaphorical source word than those generated by a group of participants who had not heard the story before the association task. As expected, the latter did not differ from the associations to target words that had been presented in a non-metaphorical context. There were no effects of delay. We discuss these findings with respect to theories on metaphor comprehension and to lexical retuning and episodic accounts of long-lasting meaning processing in context.

Curtis, A. J., Mak, M. H. C., Chen, S., Rodd, J. M. & Gaskell, G. M. (2022). Word-meaning priming extends beyond homonyms. *Cognition, 226,* 105175. https://doi.org/10.1016/j.cognition.2022.105175

Keywords: language processing, semantics, metaphor
Presentation type: Oral presentation / Talk
Session: Language

Evidence of a metacognitive illusion in stimulus-specific prospective metacognitive judgments of distraction by music

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Two experiments were conducted to examine how people arrive at stimulus-specific prospective metacognitive judgments of distraction by music. According to the direct-access account, people have a direct access to the processes underlying distraction, for example, to the degree that different types of sounds capture their attention. According to the processing-fluency account, people rely on the processing-fluency heuristic to make judgments about the distracting effects of music. To test these competing accounts against each other, we manipulated the playback direction of music in two experiments by playing piano melodies in forward or backward direction. Replicating previous findings, forward and backward music disrupted serial recall to the same degree. However, subjective fluency ratings showed that forward music was perceived to be more fluently processed than backward music. Stimulus-specific prospective metacognitive judgments showed that only backward music was judged to be distracting, whereas forward music was not ascribed a distracting effect in comparison to quiet. These results support the processing-fluency account and contradict the direct-access account.

Keywords: metacognition, distraction, working memory, metacognitive illusion, judgments of distraction, selective attention, memory
Presentation type: Oral presentation / Talk
Session: Metacognition and Problem Solving

Episodic retrieval in task switching: Repeating the response induces retrieval of the task.

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In task switching, response repetitions (RR) yield performance benefits compared to response switches, but only when the task also repeats. When the task switches, RR benefits vanish or even turn into RR costs. This interaction can be explained by task-response binding and retrieval processes. Accordingly, RR costs in task switches indicate that the task and the response become bound in trial N-1. Hence, repeating the response in trial N retrieves the N-1 task. As the N-1 task is the wrong task in task switches, this retrieval induces RR costs. In this study (Exp1: data reanalysis, N=255; Exp2: N=96), participants switched between three tasks and responded to stimuli that always afforded a response to each task. We examined task-repetition errors, namely responses that are wrong under the current task but would be correct under the N-1 task. We used task-repetition errors as indicators of erroneous re-activation of the N-1 task. Our study shows, in task switch trials, a larger probability of task-repetition errors when the correct response should have been repeated than when it should have been switched. This result aligns with a response-triggered retrieval of the N-1 task. It suggests that, after the correct task is selected, the process of response selection can loop back into task selection, occasionally activating a task that competes with the selected one. This study provides novel evidence for episodic retrieval in task switching while delving into the interplay of task and response selection.

Keywords: Response-repetition effect, feature binding, episodic retrieval, task switching
Presentation type: Oral presentation / Talk
Session: Multitasking and Cognitive Control I

Comparing Simulation Sickness and Presence in Car, Bicycle, and Pedestrian Simulators

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Due to their cost-efficient and safe testing characteristics, simulators play an important part in traffic research. Simulator studies allow for precise control over variables and confounding factors. A central aspect of these studies is the generation of realistic behavior from participants. Achieving a feeling of presence in a virtual environment is considered an important factor for natural behavior. However, simulator sickness, a common side effect among simulator users, poses a significant challenge. Nausea and disorientation can lead to unnatural behaviors, which can impact the validity of the research findings, or even cause participants to drop out. In order to be able to create scenarios and simulator settings that minimize simulator sickness and maximize the feeling of presence, we need to gain a better understanding of factors that influence the feeling of presence and simulation sickness and the relation between the two. This presentation will present presence (PQ) and simulator sickness (SSQ) questionnaire results from four different studies utilizing various traffic simulators, including pedestrian, bike, and car simulators with a VR headset or display setup. The results show the lowest SSQ scores in a setup with displays instead of VR headset. A dependency of the study task was revealed, showing that more dynamic movements are related to more simulator sickness. Regarding the presence questionnaire no influence of the simulator type or the study design could be found. However, a correlation between the SSQ score and the PQ can be shown, indicating that higher SSQ scores are associated with lower PQ scores.

Keywords: Simulator Sickness, Presence, VR, Traffic Simulation
Presentation type: Oral presentation / Talk
Session: Traffic Psychology II: Perceptual aspects

Investigating the dynamics of cognitive processing by effect course analysis on response times and error rates

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The traditional analysis approach in cognitive psychology aggregates behavioral measures as response time (RTs) and error rates (ERs) across all trials of a particular condition occurring in the experimental session. Implicitly, this approach assumes that cognitive processing is stationary during the experimental session. This assumption, however, is questioned by observations of practice-induced changes in experimental effects. Here, we present a new method, the effect course analysis, to study practiced-induced effect changes during an experimental session. The effect course analysis is a model-free, non-parametric method designed to reveal effect changes within an experimental session on a continuous time scale. This method is based on cluster-based permutation testing, which is widely used in the analysis of neuro-physiological data. The effect course analysis depicts the time course of an experimental effect by contrasting smoothed RTs / ERs of two experimental conditions along the trials of the experiment and testing at which point in the experiment it is unlikely to obtain such an effect (difference between conditions) by chance using cluster-based permutation tests. By re-analyzing previously published data sets, we show that experimental effects may not be static, but change during the course of an experimental session. Hence, if one cannot be certain that cognitive processing is stationary; investigating the time course of experimental effects appears an intriguing approach to determine how cognitive processing is influenced by practice.

Keywords: Effect course, cognitive plasticity, practice effects, response times, error rates
Presentation type: Poster Presentation
Session: Methods

Inducing Garner Effects in Manual Size Estimation

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Garner interference (GI) occurs when certain stimulus dimensions, like the length and width of a rectangle, cannot be independently processed. Ganel and Goodale (2003, Nature) reported that GI occurred in speeded-classification and manual size estimation (ManEst), but not in visually-guided grasping. This was taken as further evidence for the Perception-Action Model, which posits that visual information is processed in a fundamentally different way for actions (like grasping) than for perception (like speeded-classification and ManEst); with vision-for-action being attributed to the dorsal cortical stream and vision-for-perception to the ventral stream. However, in our replications and a meta-analysis, we found that it is surprisingly difficult to replicate GI in ManEst. One possibility to resolve this issue is manipulation of online visual feedback: GI in ManEst was typically tested closed-loop (participants had full vision of hand and stimulus). In the current experiment (planned N=24), we will use open-loop conditions (vision is suppressed after start of the movement). There is some evidence that open-loop conditions favor the occurrence of GI by altering the temporal profile of the responses (Hesse & Schenk, 2013, Behavioral Brain Research). Further, we will include a 'correlated' condition to analyze Garner facilitation in addition to GI. Unlike GI, Garner facilitation allows a comparison of conditions with an equal number of stimuli presented per block (Garner, 1970, American Psychologist) and has not been investigated in ManEst. Taken together, we will investigate when and under which conditions Garner effects occur in ManEst, trying to clarify which processing guides vision-for-perception.

Keywords: Action, perception, manual estimation, Garner interference
Presentation type: No-Data Poster
Session: Motor and Action Control

The role of the working memory storage component in a random-like series generation

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People are not equipped with an internal random series generator. When asked to produce a random series they simply try to reproduce an output of known random process. However, this endeavor is very often limited by their working memory capacity. Here, we investigate the model of random-like series generation that accounts for the involvement of storage and processing components of working memory. In two studies, we used a modern, robust measure of randomness to assess human-generated series. In Study 1, in the experimental design with the visibility of the last generated elements as a between-subjects variable, we tested whether decreasing cognitive load on working memory would mitigate the decay in the level of randomness of the generated series. Moreover, we investigated the relationship between randomness judgment and algorithmic complexity of human-generated series. Results showed that when people did not have to solely rely on their working memory storage component to maintain active past choices they were able to prolongate their high-quality performance. Moreover, people who were able to better distinguish more complex patterns at the same time generated more random series. In Study 2, in the correlational design, we examined the relationship between working memory capacity and the ability to produce random-like series. Results revealed that individuals with longer working memory capacity also were to produce more complex series. These findings highlight the importance of working memory in generating random-like series and provide insights into the underlying mechanisms of this cognitive process.

Keywords: working memory, random numbers generation, algorithmic complexity, working memory capacity, random series production
Presentation type: Oral presentation / Talk
Session: Working Memory

Characterizing the dynamic representation of events with variable predictiveness using dynamic RSA

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Perceiving and reacting to external events in real time requires our brain to continuously generate predictions about upcoming events. These predictions can be examined more closely using a dynamic extension of Representation Similarity Analysis (dRSA). This approach uses temporally variable models of representational similarity to characterize the representational content at each time point of a temporally extended, unfolding event. dRSA allows testing if stimulus features such as position or motion of a moving object are represented in a predictive or delayed manner. Results of a previous Magnetencephalography (MEG)-based dRSA study that focused on human body movements demonstrated lagged and predictive representations of body part position and motion direction, respectively (de Vries & Wurm, Nature Communications, 2023). However, the precise influence of stimulus feature parameters, in particular the predictability of observed movements, on the timing and duration of lagged and predictive neural representations remains unclear. Therefore, in a pilot MEG study using more controllable stimuli, we aim at investigating how predictability influences at what time point the brain represents dynamic events: Participants watch 30-second videos of a moving dot while the likelihood of the dot maintaining its current direction at each time point is systematically varied. Applying dRSA, we capture the neural representations of stimulus features such as dot position and direction. We expect that these features will be represented before their actual occurrence for highly predictable dot motions whereas more unpredictable movements will be represented in a delayed manner.

Keywords: Predictive Coding, Representational Similarity Analysis, Visual Processing, Perception
Presentation type: No-Data Poster
Session: Perception III

The Role of Avatar Perspective in Level 1 Visual Perspective Taking for Humans and Robots

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Research on level 1 visual perspective taking (L1-VPT) has been debating whether L1-VPT is an implicit socially rooted or rather a non-social process. Using online versions of the dot perspective task (Samson et al., 2010) we approached this question by comparing L1-VPT for robot vs. human avatars, presuming that social perspective taking due to mentalizing should occur more strongly for the human avatars, leading to altercentric and egocentric intrusions. The experimental design was manipulated within subjects: 2 (avatar: human, robot) x 2 (avatar perspective: consistent vs. inconsistent) x 2 (task: avatar perspective vs. self-perspective). Experiment 1 ($N = 121$) used a male, Experiment 2 ($N = 117$) a female human avatar. While reaction time measures in Experiment 1 confirmed our prediction of stronger altercentric intrusions for human than for robot avatars, in Experiment 2 and for error rate based intrusions, we found no significant differences between human and robot avatars. In addition, in both experiments and for both measures significant perspective x consistency interactions were found, the consistency effect being stronger for the other perspective than for the self-perspective. This suggests an egocentric bias with participants' successful shielding against altercentric intrusions and a generally low level of implicit mentalizing. Yet, still in line with the mentalizing approach and to be further investigated, an explorative analysis of the combined data showed subtle effects of gender congruency: When the participants' biological and the sex of the human avatar were congruent, the levels of error-rate-based altercentric intrusions were enhanced.

Keywords: Level 1 perspective taking, avatars, robots, self-other-distinction, gender
Presentation type: Poster Presentation
Session: Human Factors II

Can EEG signals be used to detect stimulus changes better than the direct report of participants?

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We aim to improve stimulation sequences used to induce steady-state visual evoked potentials (SSVEPs) in brain-computer interfaces: The user fixates a flickering stimulus with the phase of the flicker coding the to-be-transmitted information. Using electroencephalography (EEG), SSVEPs are recorded and the phase of the stimulus is decoded from the EEG signal by a machine-learning classifier. We use high-frequency flicker (above the flicker-fusion threshold) to alleviate undesirable side effects such as visual fatigue, or headaches. Nevertheless, when phase transitions are introduced these are perceived as flashes which still can distract the user. Therefore, we reduced the perceptibility of phase transitions by, for example, gradually converting a flickering black/white stimulus to the perceived mid-gray level, then shifting the phase by repeating the perceived mid-gray level stimulus accordingly, and then gradually converting back to the full black/white contrast. This attenuated the detection rate of phase transitions to acceptable levels (62.5% accuracy). Here, we will test whether with such improved stimuli it is still possible to decode the phases of the flicker and thereby transmit information. Participants (N=24) will perform a two-alternative forced choice discrimination task trying to detect phase transitions. In parallel we will record EEG and a machine-learning classifier will decode the stimuli's phases.

Keywords: flicker-fusion threshold, phase transition, flicker perception, attention, electroencephalography/EEG, steady-state visual evoked potentials/SSVEP, brain-computer interfaces/BCI
Presentation type: No-Data Poster
Session: Methods

A TVA analysis of the Stroop and Simon effect

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Both the Stroop and the Simon task are typically viewed as tasks requiring cognitive control: Both tasks include task relevant and task-irrelevant stimulus information, and the main difficulty of the task is to act on the relevant information while ignoring the irrelevant information. Both tasks include a condition in which task relevant and task irrelevant information are compatible, that is, they evoke the same response, and a condition in which the information are incompatible, that is, they evoke different responses. Different theoretical accounts have been proposed, making different assumptions on the nature and location of the conflict. We present the results of an accuracy-based variant of both tasks without time pressure to give a response, minimising the effect of response conflict. The data were modelled with the Theory of Visual Attention (TVA; Bundesen, 1990) framework. The results provide clear evidence for differences between the two tasks in terms of the time relevant and irrelevant stimulus information are available and thus can create conflict. Also, we obtained evidence for the conclusion that a Simon effect is present also in a purely accuracy-based task. We discuss potential implications of these results for cognitive control theories of those tasks and outline a TVA-based model that is applicable to response time data obtained in these tasks.

Keywords:
Presentation type: Oral presentation / Talk
Session: Progress in TVA-based Visual Attention Research: From Fundamentals to Applications I

Revealing the Dimensions Underlying Human Action Recognition

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How do we understand the actions performed by other agents? Examining the dimensions underlying the organization of observed actions can gain insights into the way this task is achieved. To reveal such dimensions, we used crowd-based similarity ratings of a large number of actions depicted as short video clips combined with a computational model.
First, we generated and characterised a large stimulus database of 768 one-second video clips selected from the Moments in Time dataset, spanning 256 action categories with three exemplars each. To aid in the selection and editing process of the final set of videos, we used a customized neural network model, based on ResNet-50.
Second, we gathered 1.25 million similarity ratings, using an online triplet odd-one-out task. Ratings were fed into a computational model (SPoSE), which revealed 28 meaningful action-dimensions, including hand-/ tool-relatedness, sport and communication. These dimensions were further tested for interpretability and usability in a separate group of participants. In this talk we will discuss how these dimensions contribute to the existing literature regarding the organization of human actions.

Keywords: action-recognition, action-dimensions, computational model
Presentation type: Oral presentation / Talk
Session: Cognitive and Neural Processes Underlying the Perception of Actions, Scenes and Objects I

Memory updating after prediction errors in naturalistic conversations

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The brain continuously makes predictions about what is going to happen next and uses episodic memories in the process. If there is a mismatch, a prediction error arises and can lead to memory updating, consisting of new learning, and forgetting of the old episode in order to improve future predictions.

We tested whether these effects extend to naturalistic conversations and whether the size and quality of prediction errors influence this process. Participants encoded original versions of short conversations and later heard the same dialogue in a modification. We manipulated encoding frequency of the original episodes (prior precision) and amount of difference between originals and modifications (prior accuracy). Furthermore, some changes consisted merely of paraphrases (surface level), while others altered the meaning of the statement (gist level). In a recognition test, we tested memory for the original as well as the modification.

While changes in the dialogues generally led to reduced recognition of the original version, this effect was slightly more pronounced with medium prediction errors, produced by big changes with weak priors or small changes with precise priors. Furthermore, bigger gist changes led to increased recognition of modifications, while surface changes did not trigger new encoding. Our findings indicate that effects of new learning in response to prediction errors extend to naturalistic conversations. They also highlight that not only the size of the prediction error, but also its quality influence memory outcomes, with new learning primarily occurring when critical new information is offered through gist changes.

Keywords: episodic memory, prediction error, predictive coding, memory change, memory for conversations
Presentation type: Poster Presentation
Session: Memory and Learning II

Associative inference is enhanced by ingroup sources

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Memories can be significantly altered in conversations with others and previous research shows that ingroup members have elevated influence on our memories. While most previous mnemonic ingroup advantages have been limited to single discreet episodes, episodic memory crucially also involves flexible processes, through which separate episodes can be recombined to extract new knowledge. Therefore, we tested whether associative inferences across separate but related events are enhanced by an ingroup persona presenting the information. In three separate studies (N_{Study1}=53, N_{Study2}=68, N_{Study3}=68), participants encoded episodes made up of two elements (AB) and later overlapping episodes (BC). The ABs were presented either by an ingroup or an outgroup persona. Participants were tested on indirect inferential associations (AC), direct pairs, and source memory.

In Studies 1 and 3, where ingroup and outgroup were made up of two personas each, participants were more accurate and confident for inferences based on ingroup information compared to outgroup information. This effect disappeared when there was only one persona per group (Study 2), indicating that a group perception may be critical. The ingroup inference advantage was linked to different source monitoring demands, with outgroup source information potentially being given priority over encoding the information itself. In conclusion, we showed that mnemonic ingroup advantages extend to flexible processes, which can contribute to the spreading of bias in an individual's knowledge network.

Keywords: episodic memory, associative inference, ingroup bias, social memory effects
Presentation type: Poster Presentation
Session: Memory and Learning I

Try harder! - The influence of effort instruction on fake production costs in basketball novices and experts

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Previous experiments demonstrated that producing passes with head fakes in basketball generates higher initiation times (IT) and error rates than producing passes without head fakes (Güldenpenning et al., 2023). This study investigated whether these production costs can be minimized when using effort instructions. Such performance improvements can be predicted based on the assumption that the cognitive capacity, which is available in a given task, may not fully be used for task preparation, but also partly for ongoing monitoring processes. If needed, however, more cognitive capacity can be willingly devoted to the task (Kahneman, 1973). Steinborn et al. (2017) demonstrated that presenting effort instructions (i.e., "try harder") in 20% of trials led to performance improvements. We adopted the probe-trial approach of Steinborn et al. (2017) and presented effort instructions in 20% of all trials before participants produced passes with and without head fakes. In the remaining 80% of the trials, the standard instruction was presented. Also, basketball novices and experts were tested to examine the effect of expertise on the effectiveness of effort instructions. As expected, experts were generally faster (i.e., shorter ITs) than novices [$F(1,52) = 4.89$, $p = .031$]. There was a significant interaction between the factors type of instruction (standard vs. effort) and expertise [$F(1,52) = 13.27$, $p = .038$]. Post-hoc tests revealed that novices displayed reduced initiation times after receiving effort instructions independent of the type of pass they had to produce, while experts showed improvements only for passes without head fakes.

Keywords: action preparation, perception, movement planning, deception
Presentation type: Oral presentation / Talk
Session: Cognitive Effort

Unpacking the Impact of Retrieval Context: Investigating the Emotionality of Odor-Evoked Autobiographical Memory with the Single Cue Delayed Rating Method.

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The assessment of odor-evoked autobiographical memories (OEAMs) typically yields in the finding that OEAMs are more emotional compared to autobiographical memories (AMs) evoked by other modalities. To date, there are only speculations as to why this could be the case, which range from neuroanatomical explanations - the olfactory sense has a unique neural pathway that projects into the amygdala and limbic areas - to the idea that the olfactory sense could play a more important role in the emotional period of childhood. Notably, prior studies in this domain share a design feature: the retrieval and evaluation of AMs occurs in close temporal proximity. Thus, we hypothesize that there could be a misattribution of the heightened emotionality of processing the odor to the evaluation of the retrieved AM. To test this hypothesis, we implemented a new method, the so-called Single Cue Delayed Rating Method. Analogous to the typical methods, participants are presented with stimuli of different modalities and asked to retrieve AMs in response. Importantly, for half of the AMs the ratings are obtained immediately, while half of the ratings are conferred to a follow-up session. In our study, 60 participants had to retrieve AMs in response to odors and words. The follow-up session was four weeks later. If the misattribution hypothesis is valid, we expect heightened emotionality of OEAMs compared to word-evoked AMs only in the immediate, but not the delayed rating condition, since the possible spill-over effect of the processing of the odor should not persist for 4 weeks.

Keywords: autobiographical memory, olfaction, OEAMs, proust effect, autobiographical memory retrieval
Presentation type: Oral presentation / Talk
Session: Retrieval processes in autobiographical remembering

The Curve of Control: the relationship between the feeling of difficulty and cognitive control”

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The concept of the U-shaped curve has been a well-established fundamental principle in the realm of psychological science, especially in theories related to motivation. This research (N=330), aimed to empirically validate the prediction of a non-linear, U-shaped relationship between task difficulty and the adaptation of control. Grounded in Motivational Intensity Theory (MIT) and the expected value of control (EVC) framework, our hypothesis posited that an increase in task difficulty will be followed by an increase in control intensity, until a maximum tolerable level, after which it would decrease. To test this hypothesis, we conducted two experiments utilizing Stroop-like conflict tasks, systematically manipulating the number of distractors to modulate task difficulty. Control adaptation and subjective task difficulty was measured. The results uncovered a curvilinear relationship between perceived task difficulty and the adaptation of control. These findings provide empirical support for the theoretical accounts of MIT and EVC, emphasizing the nonlinear nature of the relationship between task difficulty and cognitive control.
Keywords: cognitive control, task difficulty, motivational intensity, expected value of control
Presentation type: Oral presentation / Talk
Session: Affect, motivation and control I

Time perception during out-of-body-experiences in virtual reality

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According to the notion of an embodiment of time, changes in body perception and changes in attention to body-related processes should be associated with changes in subjective time flow. Virtual reality (VR) offers the possibility to manipulate perceptual and attentional processes and to induce body-dissociative states (out-of-body experiences). To provide evidence for the embodiment of time, our study aimed to investigate whether out-of-body experiences induced via immersive VR are accompanied by changes in the perception of time. Therefore, we induced out-of-body experiences by synchronous visuotactile stimulation of the participant and a virtual avatar. As a control condition, visual and tactile stimulation was applied asynchronously. In both conditions, participants performed time production tasks. Furthermore, we measured the strength of the illusion by measuring the proprioceptive drift. In this talk, our methodology and first results will be presented and discussed.

Keywords: Virtual Relality, Time Perception, Embodied Cognition, Embodied Time
Presentation type: Oral presentation / Talk
Session: Virtual Reality and the Perception of Time

Modeling adult age differences in information acquisition during risky choice

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There are systematic differences in younger and older adults' decision making under risk. Previous research has mainly focused on comparing the two age groups in terms of their choice behavior. Very little is currently known about the cognitive processing underlying age differences in risky choice. We analyzed younger and older adults' information acquisition behavior, measured with a process-tracing software MouselabWEB, with a neurocognitive Markov attention model (He & Bhatia, 2023). According to the model, information acquisition is guided by a mixture of different policies, one of them being an interactive attention policy that transitions between an outcome and its corresponding probability depending on the respective sizes of the attribute values. We applied this model to data from 90 younger and 90 older adults who completed 242 risky choice problems. While both age groups were more likely to transition from a probability to its corresponding outcome when the probability was high, this sensitivity to differences in probabilities was reduced for older adults. Participants with lower sensitivity to differences in probability in the interactive attention process also selected the option with the lower expected value more often and they showed lower probability sensitivity when their choices were modeled with cumulative prospect theory. Our findings suggest that reduced sensitivity to probability differences is a key factor for adult age differences in risky choice and point to a formal account of the neurocognitive processes underlying age differences in attention allocation.

Keywords: decision making, predecisional search, aging, process tracing
Presentation type: Oral presentation / Talk
Session: Computational modeling in experimental psychology: Linking model-based and processtracing analyses

The effects of bilingual cross language activation on visual object search

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People who regularly use multiple languages concurrently activate information from all known languages, called "non-selective activation" in psycholinguistics. Evidence comes from cognates, words overlapping in form and meaning across languages, like "SAXOPHONE" in German and English, and interlingual homographs (IH) words sharing form but not meaning across languages like "HUT" meaning "HAT" in German. Previous research suggests that in bilinguals processing of cognates is facilitated, whereas processing of IH is impaired compared to language-unique words (LU).

Here we investigated how non-selective activation interacts with visual processing. German-English bilinguals performed a word-cued object search in a 10-image array with their eye-movements being recorded. Search difficulty was manipulated through cross-language ambiguity using English-LU, cognate or IH cues. In addition to random distractors, search arrays included no-competition or semantic-competition for all cues (e.g., GUITAR for SAXOPHONE) and translation-competition (non-target meaning of the IH) for IH (e.g., HAT for HUT).

The results reveal IH interference but no cognates facilitation effect. Semantic competitors received more attention than random distractors, but both received fewer and shorter fixations than translation competitors. This demonstrates coactivation of semantically related concepts during language processing as competitors are responded to with longer and more frequent fixations than random distractors. We hypothesize that competitors receive more attention because they provide contextual information that solves cross-language ambiguity and guides visual search, which is further evidenced by processing facilitation on trials that include semantic or translation competitors. Overall, these results suggest that language non-selective activation interacts with visual processing.

Keywords: Bilingualism, non-selective activation, visual search, eye-tracking
Presentation type: Poster Presentation
Session: Perception III

Tracking memory function in migraine and mild traumatic brain injury: preliminary analyses in pediatric and adult cohorts

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Introduction: Migraine and mild traumatic brain injury (mTBI) are common in children, adolescents, and adults. Regarding memory function, limited data is currently available for both migraine and mTBI compared to healthy controls, and especially long-term memory has not been investigated yet. In migraine and mTBI evidence points at activity changes in networks, which play a role in memory function.
Methods: Memory function is investigated using a computer-based tool with an iterative, adaptive paired-associate test presenting verbal and non-verbal visual items. Memory consolidation strength is calculated based on the rate of the forgetting (RoF) of each particular item. Differences in RoF are investigated between patients with migraine or mTBI and healthy controls in cohorts of adult migraine, pediatric migraine, and pediatric mTBI, respectively. In addition, within-subjects comparison of RoF in adult migraine patients is done for 3 time points across 4 months.
Results: Results of preliminary analyses will be available at the time of the conference.
Conclusion: The findings of these studies may help to evaluate whether RoF can serve as a lokw-cost sensitive behavioral marker during trajectory of migraine and mTBI. A low invasive, highly precise adaptive computerized, point of care tool to monitor cognition will be of great value both in day-to-day care and scientific research. Despite the importance of neuropsychological testing in clinical settings, the currently available tools afford both time and trained professionals performing the tests. Therefore, a novel tool based on RoF could help to offer cognitive testing with low threshold.

Keywords:
Presentation type: Oral presentation / Talk
Session: Adaptive Retrieval Practice and its Applications in Education and Health

Conflict primes and effort: The shielding effects of volitional processes

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Recently, we have reported first conclusive empirical evidence that primed cognitive conflict is effortful in terms of effort-related cardiovascular responses (Bouzidi & Gendolla, 2023). In line with the conflict signal hypothesis, we posited that this effect occurred because of cognitive conflict's aversive nature. Additionally, from a volitional perspective, action control processes are said to be efficient cognitive tools for shielding individuals against incidental affective influences. In this talk, we present two studies using a conflict priming paradigm (Dreisbach & Fischer, 2012). We will first present results that aimed to show that conflict effects on effort can be moderated by individual differences in action-state orientation. Second, we will present results showing that this shielding effect also occurs if individuals can personally choose task characteristics. As expected, both dispositional action-orientation and personal choice attenuated the impact of conflict primes on cardiovascular indices of effort. Our results shed new light on the beneficial role of action control processes on conflict-related affective influences on effort. Furthermore, our studies provide the first evidence that cognitive conflict is indeed effortful using a paradigm that allowed disentangling the impact of cognitive conflict from a mere response difficulty effect.

Keywords: Cognitive Conflict, Priming, Effort, Action Control
Presentation type: Oral presentation / Talk
Session: Affect, motivation and control I

Sensorimotor prediction guides eye movements toward task-relevant feedback locations

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Previous research has shown that action outcomes are internally predicted before outcome feedback becomes available. To test whether these sensorimotor predictions are used to facilitate visual information uptake for error feedback processing, we measured eye movements during the execution of a goal-oriented throwing task. On each of three days, 17 right-handed participants (10 female) executed 500 ball throws using a metal lever, with the resulting movement effect being solely observable on a screen. After receiving continuous visual feedback about ball flight in sessions one and two, ball flight was masked in a subset of trials in session three, with only static outcome feedback being provided. In all sessions, we observed a large proportion of predictive saccades, shifting gaze towards the goal region before the ball arrived and outcome feedback became available. Gaze positions after predictive saccades systematically covaried with future ball positions in trials with ball flight information, but notably also in trials with masked ball flight when only internal movement information was available. Fixation durations at the chosen positions after feedback onset were modulated by outcome (longer durations for misses than for hits) and its uncertainty (longer durations for narrow vs. clear outcomes). Combining both effects, durations were longest for narrow errors and shortest for clear hits (270.88 ms vs. 173.41 ms). This result pattern indicates that chosen locations correspond to informational value for processing error feedback and task execution. Thus, humans use sensorimotor prediction to direct their gaze toward task-relevant feedback locations.

Keywords: sensorimotor prediction, predictive eye movements, forward model, action effect monitoring, throwing task
Presentation type: Oral presentation / Talk
Session: Action Control

Multimodal and crossmodal predictions in the brain for experiencing music and art

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Lately, the influential predictive processing (PP) framework for understsanding brain function has landed into the neuroaesthetic research field to elucidating the assessment of art objects when considered in isolation within a single sensory modality. In the realm of music neuroscience, compelling evidence has emerged highlighting the PP-related neural mechanisms that govern aesthetic preferences for, e.g., medium complex harmonies and rhythms. Similarly, within the domains of figurative arts and literature, several scholars have postulated the pivotal role of PP in shaping aesthetic emotions and judgments. However, artistic experiences are, by nature, situated and multisensorial. In our recent behavioral and neurophysiological studies, we investigated whether affective representational (i.e., semantically meaningful) predictions from one sensory modality could cross-modally modulate the neural responses to non-representational objects in another modality. Additionally, we delved into investigating how the summation of stimulation from multiple sensory channels might impact on the neural correlates and behavioral assessment of a classical opera by Mozart. Overall, our findings underscore the relevance of examining the neural mechanisms underlying the aesthetic experience in its eternity, embracing its multimodal and crossmodal richness.
Keywords: empirical aesthetics, neuroaesthetics, predictive processing, auditory cognitive neuroscience, music, art
Presentation type: Oral presentation / Talk
Session: Experimental Aesthetics II

Is space-time interference asymmetric? A conceptual replication of Casasanto and Boroditsky (2008)

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The previous finding of asymmetrical space-time interference (Casasanto & Boroditsky, 2008) has been considered as important evidence for the assumption that spatial metaphors are employed when talking or thinking about time. In the present study, we aimed to replicate the asymmetrical space-time interference with slight modifications of the original design. Participants were presented with horizontal lines of different lengths and durations. In contrast to Casasanto and Boroditsky's original design, the tested durations were in the subsecond range (200 – 1000 ms) instead of the suprasecond range, and length and duration judgments were assessed via visual analogue scales instead of reproductions. In Experiment 1, participants received the information about the relevant task dimension in each trial only after the presentation of the line. In Experiment 2, the information was provided before the presentation. The results of Experiment 1 replicated the previous asymmetrical space-time interference. Both dimensions interfered with judgments of the other dimension, and the influence of line length on duration judgments was about two times as large as the effect of duration on length judgments. Preliminary results of Exp. 2 (N = 18, planned N = 25), however, do not show an asymmetric pattern.

Keywords: time perception, spatial perception, space-time interference, conceptual metaphor, cross-modal interaction
Presentation type: Poster Presentation
Session: Perception I

Does required response force modulate conflict processing in the Simon Task?

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Uncertainty exists about the specific involvement of motor processes in conflict resolution. Specifically, while previous findings have shown that distracting information can interfere with both premotor and motor processes, it is unclear how changes in motor processing demands influence conflict resolution. To address this gap, we developed a modified visual Simon task in which participants responded by moving a slider either to the left or right, with the required movement force randomly varying within blocks (easy vs. middle) and required motor precision (large or small response areas) varying between blocks (low vs. high). We hypothesized that increased motor demands (i.e., force and/or precision) would lead to enhanced action control, potentially mitigating the impact of spatial-based activation. Consistent with our hypothesis, the Simon effects in overall movement times were smaller in trials requiring more response force when high but not when low motor precision was required. Additional analyses revealed that these interactive effects were primarily reflected in the later movement phases rather than during initial movement initiation, suggesting that particularly late motor processes are better shielded from distractor-based activation when motor demands increase. Thus, these findings suggest that action control can be flexibly regulated in response to increases in motor demands by more strongly activating the target-based motor response, which reduces the contribution of distractor-based motor activation. Overall, our findings emphasize the importance of considering motor processes in conflict resolution.

Keywords: Simon task, Action control, Motor demands
Presentation type: Oral presentation / Talk
Session: Simon and his friends: New insights into the processing of task-irrelevant information

Diffusion Model Analysis of the Effects of Achievement Motive Frustration

Max Brede, Veronika Lerche
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The goal of this study is to replicate and expand upon the Brunstein and Maier (2005) experiment, which examined the effects of performance feedback and implicit achievement motive strength on task performance in an attention task. In the just mentioned study, more achievement-oriented individuals exhibited a decrease in mean RTs in response to bogus negative intraindividual performance feedback. The authors interpret this decrease in mean RTs as increased effort. This feedback by achievement motive interaction effect is one of the central experimental findings in the achievement motive literature. However, the effect has not yet been replicated. Like in the study by Brunstein and Maier, participants of our study completed a d2-R-like attention task while being given positive or negative bogus intraindividual performance feedback. Our study aims to firstly replicate the feedback by achievement motive interaction effect as described by Brunstein and Maier. Secondly, it uses the diffusion model (Ratcliff, 1978) to obtain a deeper understanding of the cognitive processes involved. In addition to the outcomes of our replication study, we will also provide the findings of a study in which we demonstrate the diffusion model's suitability for the kind of task used by Brunstein and Maier. In summary, we argue that analyses of diffusion model parameters can contribute to a deeper comprehension of the consequences of achievement motive dissatisfaction.
Keywords: Achievement Motive, Diffusion Model
Presentation type: Oral presentation / Talk
Session: Drift Diffusion Modeling

A computational model of aesthetic value

Aenne Brielmann
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Do you like that image or swipe it away? Where do you want to live? Numerous decisions partly depend on options' sensory appeal, their aesthetic value. Yet, we have a poor understanding of how objects and experiences gain such value. We propose the theory that aesthetic value is a signal for maintaining and adapting the states of the cognitive-sensory system to process stimuli effectively now and in the future. Two interlinked components generate an object's aesthetic value: 1) processing fluency 2) learning. We show that a computational model that realizes the theory can replicate past experimental results on the effects of exposure, symmetry, and complexity as well as predict people's liking judgments on a trial-by-trial basis. Our theory along with its computational implementation has several important implications. One, because it postulates an essential link between sensory processing and valuation, it provides a theoretically grounded reason for why the features of standard convolutional neural networks can be used to predict aesthetic value judgments. Two, its dynamic nature calls to attention sequence effects that have so far often been ignored. Third, said dynamics link aesthetic valuation to other phenomena that empirical aesthetics has so far rarely investigated. Specifically, we propose that our theory naturally offers an account of exploration, exploitation, and boredom in the sensory domain.
Keywords: aesthetics, computational modeling, perception, reward learning, predictive processing
Presentation type: Oral presentation / Talk
Session: Experimental Aesthetics I

A smile makes my heart beat stronger: Evidence for the joint impact of facial expressions of emotion and implicit motives on effort-related cardiovascular reactivity

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Facial expressions of emotion can function as social (dis-)incentives, depending on the perceiver's implicit affiliation or power motives. Specifically, submissive vs. dominant displays are supposed to be positive vs. negative social incentives for power-motivated perceivers, whereas friendly vs. hostile displays are supposed to be positive vs. negative social incentives for affiliation-motivated perceivers. Past research has demonstrated corresponding influences on attention orientation, action selection, and implicit learning. We present two studies, in which we tested the impact of emotion emojis embedded in a cognitive task on the effort that participants mobilized during task performance. Implicit power and affiliation motives were measured with the Picture Story Exercise, which quantifies the content of imaginative stories written in response to ambiguous picture cues. Effort was operationalized as sympathetically-driven cardiovascular reactivity. Results revealed that highly power-motivated participants showed less cardiovascular reactivity when dominant displays were shown after successful trials (Study 1). Moreover, highly affiliation-motivated participants showed stronger cardiovascular reactivity when friendly displays were shown after successful trials (Study 2). These studies demonstrate that dominant facial expressions lead to disengagement in terms of reduced effort if individuals are highly power-motivated. Furthermore, friendly facial expressions lead to increased task engagement in terms of effort if individuals are highly affiliation-motivated. The same facial expression of emotion (e.g., smile) may not motivate everybody in the same way: It depends on the person's prevalent implicit social motive and the corresponding (dis-)incentive quality of the emotional display.

Keywords: motivation, implicit motives, facial expressions of emotion, mental effort, cardiovascular reactivity
Presentation type: Oral presentation / Talk
Session: The intensity of mental effort: Hot news from the body

Reducing Cheap Talk: How do Incentives Affect the Accuracy of Metamemory Judgments?

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The accuracy of metacognitive judgments is rarely incentivized in experiments, hence, it depends on the participants' willingness to invest cognitive resources and respond to the best of their knowledge. According to arguments promoted in economic research, metacognitive abilities might have therefore been underestimated in the past. In two experiments (N = 128 and N = 129), we explored the impact of incentives on the accuracy of JOLs (judgments of learning), memory performance, and cue use using word lists and free recall. We introduced a linear payoff scheme with a maximum of 5 cents per judgment to promote the accuracy of JOLs in predicting recall success while simultaneously discouraging participants from strategic responding in the memory test. The results showed that incentivization of JOLs had no effect whatsoever on memory performance which is good news. Metacognitive accuracy in terms of resolution (Kruskal's Gamma) was slightly improved in Experiment 1, but not in Experiment 2. On the more negative side, the incentives boosted JOLs indiscriminately, producing substantial overconfidence. A deeper analysis including cues like word concreteness, imagery, arousal, frequency, subjective relevance and font size showed their usual and simultaneous effects on JOLs that were, however, largely unaffected in size by incentivizing JOLs. In summary, incentives for accuracy do not improve the resolution accuracy of JOLs to an extent that outweighs the inflation of overconfidence. Hence, the current results do not imply future use of incentivized studies in the field of metamemory.

Keywords: metacognition, metamemory, judgment, incentives, accuracy
Presentation type: Oral presentation / Talk
Session: Recent Insights on the Basis, Accuracy, and Impact of Metacognitive Judgments

Individual Differences in Parallel Task Processing: Still stable in unstable task environments?

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There has been substantial research exploring the capacity for parallel processing of multiple tasks. Recent studies revealed that some individuals prefer parallel processing while others favor a more serial processing style. To gain further insight into whether individual multitasking strategies reflect traits or states, we investigated their dependence on task environment predictability using the task switching with preview paradigm (TSWP). In classical TSWP, two tasks are displayed and alternate in a fixed sequence (e.g., every three trials). The stimulus of the currently irrelevant task (preview) does not change so that its response can be prepared. Previous applications of TSWP revealed that some individuals process the preview in parallel (overlapping processing) to optimize their switch performance, whereas others opted for serial processing. We extended TSWP by introducing blocks with variable task sequences, where tasks alternated unpredictably every second to fourth trial. Given that the upcoming switch was unpredictable in variable sequence blocks, we expected a reduced use of the stimulus preview by individuals preferring overlapping processing in blocks with variable relative to predictable task sequence. Preliminary analyses of currently 40 out of 60 data sets indicate performance reduction in variable relative to fixed sequence blocks, especially for overlapping processors. While this results in a shift to more serial processing under conditions of reduced predictability, individuals with an overlapping processing strategy in fixed sequence blocks still outperformed serial processors in variable sequence blocks. The results' implications for the underlying mechanisms of overlapping processing and the ongoing state-trait debate will be discussed.

Keywords: multitasking, task-switching, individual differences, state, trait, predictability
Presentation type: Oral presentation / Talk
Session: Multitasking and Cognitive Control I

Dissociating implicit and explicit monitoring in cognitive control across development: Are we aware of our cognitive control abilities?

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Being able to reflect on one's own performance is an important determinant of task success. In the field of metacognition, such metacognitive monitoring processes have been studied via judgments provided by participants. Accurate metacognitive monitoring may be especially important in challenging contexts, such as those requiring the resolution of cognitive conflict. In so-called conflict tasks, participants attend to relevant information while ignoring irrelevant information. When the relevant and irrelevant information prompt different responses, cognitive control is required to respond correctly. Many theories of cognitive control assume the existence of a conflict monitoring mechanism which detects conflicts and alerts the system to upregulate the relevant and downregulate the irrelevant information (Botvinick et al. 2001). Evidence for this comes from the observation that conflict processing is affected by previously experienced conflict. However, it remains unknown whether the rather unconscious, automatic conflict monitoring thought to occur in conflict tasks is related to the conscious, reportable monitoring studied in metacognitive studies. Here we aimed to directly investigate this link across development. Two groups of children and an adult group completed a metacognitive version of the animal Stroop task (Bryce et al. 2011). After responding to each trial, participants gave an explicit metacognitive judgment of their reaction time (RT). Preliminary results indicate significant conflict adaptation effects in children's RTs and rather accurate metacognitive monitoring in both groups of children. Only the congruency effect and not conflict adaptation effects are reflected in children's estimated RTs, suggesting children are not fully aware of their cognitive control abilities.

Keywords: Development, cognitive control, metacognition, conflict adaptation.
Presentation type: Poster Presentation
Session: Cognitive Control and Conflict II

Visuospatial training does not reduce the susceptibility to motion sickness

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Autonomous vehicles are expected to provide many benefits, an increased productivity of the drivers being one of them. Drivers who are released from engaging in actions associated with driving may engage in productive activities en route such as reading and writing. In this case, however, motion sickness may become even more of a problem than it currently is due to the desynchronization of the visual, vestibular and somatosensory stimulation. Smyth et al. (2021) reported the results of a study suggesting that working on visuospatial problems substantially reduces the susceptibility to motion sickness. If a simple visuospatial training would indeed prove to be effective at reducing motion sickness, then this would be very good news for people suffering from motion sickness and for manufacturers of future autonomous vehicles alike. Here we present a conceptual replication of that study using a much larger sample size than that of the original study. A 30-minute simulated drive in a virtual environment was used to induce motion sickness. During the subsequent 14 days, participants in the visuospatial-training group, but not participants in the no-training group, worked on visuospatial problems for 15 minutes a day, as in the original study. Participants then returned to the laboratory for their second 30-minute simulated drive. Motion sickness severity was substantially reduced from the first to the second drive, but the visuospatial training did not affect this reduction in motion sickness. We conclude that working on visuospatial problems does not reduce the susceptibility to motion sicknes.

Keywords: Motion sickness, autonomous vehicles, visuospatial training, mental rotation
Presentation type: Poster Presentation
Session: Cognitive Control and Conflict I

Processing of (In-)Congruent Perceptual Information During Text Comprehension

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Language processing appears to be accompanied by reenactments of "real" perceptual experiences. For example, Kaschak et al. (2005) found lower response latencies to sentence incongruent (compared to congruent) perceptual motion stimuli. In this follow-up study we investigated whether incongruent perceptual information leads to impairment in the processing of movements described in stories. Fifty-three participants (M = 28.15 years, SD = 12.26) were presented with clips while listening to auditory stories. Both the clips and the stories represented equal amounts of towards, away, or nonspecific motion (24 each) and were validated in a separate study. Matches/mismatches between story and clip direction were randomly generated. Conditions were counterbalanced and varied within-subjects. Response accuracy and response latency to a story-related item that was to be answered with "Yes" or "No" were measured. When examining the interaction of story-clip direction, contrary to our hypotheses, there was no significant impairment for incongruent story-clip information, neither for response latency as a dependent variable nor for response accuracy. Exploratively, we also considered "triple-matches" (defined by congruent directions in story, clip, and item; this combination is automatically associated with "Yes"-responses) with those mismatch-combinations that also require "Yes"-responses. Again, no significant difference between "triple-matches" and "mismatches" was detectable. Thus, the assumption of an interaction between direction-related perceptual and textual stimuli was not supported.

Reference: Kaschak, M. P., Madden, C. J., Therriault, D. J., Yaxley, R. H., Aveyard, M., Blanchard, A. A., & Zwaan, R. A. (2005). Perception of motion affects language processing. *Cognition, 94*(3), 79-89.

Keywords: language comprehension, perceptual simulation, embodied cognition
Presentation type: Poster Presentation
Session: Language

Can cognitive workload serve as an indicator for mental model development in driver assistance system usage? Insights from a multi-scenario simulator study

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New driver assistance systems can increase safety in today's traffic. However, if the mental model and knowledge of a system is incorrect or incomplete, these systems cannot unfold their full positive potential. To get an insight on mental models, many different measurement approaches have been used so far. However, some of them need to interrupt the driving task or could possibly give clues to the actual functioning of the system by asking about the features. Aim of this study is to gain an impression of the applicability of a subjective workload scale supporting the measurement of mental model development. This could provide an opportunity for an additional simple method that can be used in the driving context. Therefore, we looked at the connection between subjective cognitive workload and the development of the mental model about a driver assistance system in a driving simulator setting. Participants were differently instructed in the system functionalities. They experienced the system including lateral and longitudinal support in different urban and highway situations driving in a dynamic simulator. Within the two environments several scenarios were presented. Results show a development of subjective mental workload depending on the experienced situation. Findings regarding a possible connection with mental model development were heterogeneous.
Keywords: mental models, cognitive workload, driver assistance systems, driving simulator
Presentation type: Oral presentation / Talk
Session: Experimental Engineering Psychology and Human Factors II

Psychological science needs to move toward paradigmatic research.

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The replication crisis is both the result of suboptimal theorizing and the consequence of problematic statistics. Psychological science suffers from "parallel" and "mini" theories, as well as analogies that stand-in for well-defined theoretical frameworks. This tendency leads to the frequent reporting of intriguing yet isolated findings, which exist outside of established theories. This practice not only overlooks existing theories but also hinders the integration of knowledge within a comprehensive theoretical framework.
Kuhn (1996) suggested that science progresses in phases. He calls the initial stage of young disciplines protoscience. At this stage, disciplines gravitate towards exploratory rather than theory-driven research. His characterization of protoscience perfectly matches the current state of psychological science. According to Kuhn, the maturation of a field requires the development of a research paradigm. A paradigm serves as cohesive framework that unifies theory, measurement instruments, values, and underlying metaphysical assumptions. A paradigm is shared and agreed upon by the research community. While psychology offers such theories they are not widely used. I believe this is the result of the ubiquitous demand to make theoretical contributions. In contrast, paradigmatic research implies that scientists examine auxiliary assumptions while leaving the broader theoretical framework untouched. Rather than changing the theoretical framework, paradigmatic science strives for highly accurate measures and relatively small specifications of theoretical assumptions in the form of auxiliary assumptions. We will discuss whether psychology can adopt a paradigm and how changes in the research and review process can support this change.
Keywords: research paradigm, theory-driven, parallel theories, déjà-variable
Presentation type: Oral presentation / Talk
Session: Towards a Sustainable Experimental Psychology: Theory, Replicability, Behavior

Uncovering Interpersonal Synchronization of Eyeblinks during Sustained Mutual Gaze

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Mutual gaze has a diverse and essential role in guiding human social behavior. It not only eases communicational and collaborative tasks but also modulates mental and affective states. During mutual gazing, interpersonal synchronization of eye parameters occurs concurrently with synchronization of brain activity. Also, increased synchrony in eye parameters corresponds to higher evaluations of trustworthiness, interest, and engagement among individuals. However, the eye-tracking studies in question lack ecological validity as, to the best of our knowledge, they did not recruit real-world face-to-face dyadic pairs but used static images or videos as stimuli. Thus, targeting this challenge in literature, our study presents the first experimental setup to investigate interpersonal synchronization of eye movements during sustained mutual gazing in dyadic settings using mobile eye-tracking devices. We recruited dyads to make eye contact without any explicit verbal communication for one minute under three conditions: looking at each other face-to-face, looking at each other through a mirror, and self-gazing through a mirror. Participants also reported how connected they felt with their partners in each condition. The results revealed varying levels of interpersonal eyeblink synchronization and sense of connectedness across conditions: In the face-to-face mutual gazing condition, a higher synchronization of eyeblinks was observed along with higher ratings of perceived connectedness. These results emphasize the critical importance of investigating mutual gaze dynamics in the context of direct versus mediated interaction. The present study also calls for further investigation of eye parameters such as the correlation of gaze position and pupil size changes in real-person settings.

Keywords: mutual gaze, eye contact, interpersonal synchronization, eyeblink, eye tracking
Presentation type: Oral presentation / Talk
Session: Harnessing Gaze - Eyes for Information, Communication, and Understanding

Time as a Disruptor: Interruption in Visual Searches

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Interruptions in visual search are a common occurrence in daily life; however, they are not sufficiently explored in research. Our work explores this topic by focusing on time pressure as a potential disruptor in visual search tasks. We conducted three experiments where, where participants were asked to locate a T-shaped target among L-shaped distractors. Each trial featured two consecutive, distinct displays, each containing one target. In the first experiment, we assessed the impact of various levels of time pressure on search performance. In the second experiment, we introduced a reward condition, placing a higher value on identifying the target in the second display. In the third experiment, we introduced a condition in which the number of items in the second display was reduced, making the second search presumably easier. Overall, our results revealed that search accuracy sharply dropped as time pressure increased. Moreover, under time pressure, participants often prioritized completing the first search over a potentially more rewarding or simpler second search, and they chose to undertake the second search only when time permitted. These findings suggest that time pressure can potentially hinder the ability to modify strategies optimally according to the demands of the search task.

Keywords: Visual search, interruption, time pressure.
Presentation type: Poster Presentation
Session: Attention

The Time Course of Negation Processing - A Priming Study

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Negation is often used to correct statements (e.g. There is no dog here). Therefore, alternatives to the negated state of affairs (e.g. There is a wolf instead) are likely relevant to the comprehension of negative statements. Evidence suggests that particularly plausible alternatives (e.g. no dog → wolf) have a preferential activation status after negative statements, compared to after affirmation (Capuano et al., 2023). However, it is so far unclear whether this status is driven by the inhibition of implausible alternatives or rather by the enhanced activation of plausible alternatives. In order to answer this question, we designed a priming study to investigate the time course of the activation of words in different relations to a negated entity. In this study, we auditorily presented prime sentences with a negated entity (e.g. “There is no apple”), followed by a written lexical decision task at different Inter-Stimulus Intervals (0 ms or 750 ms) with words in different relations to the negated entity (e.g. negated entity: “apple”, or good alternative: “pear”, or worse alternative: “seed”, or unrelated: “bottle”). A pilot study showed a (non-significant) pattern of activations consistent with the selective inhibition of worse alternatives. The pilot was used to perform a power analysis for the main study. The data is currently being collected and should be finalized before the conference.

References: Capuano, F., Sorg, T., & Kaup, B. (2023). Activation levels of plausible alternatives in conversational negation. Memory & Cognition, 1-12.

Keywords: negation, alternatives, pragmatics, priming, language
Presentation type: Poster Presentation
Session: Language

Tactile perception and multisensory processing in typically developing children and blind and sighted adults

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Since birth, multisensory cues improve our interaction with the environment. For instance, the perceived hum of wings, the vibrations on our skin, and its visual appearance can help us to detect the location of an insect in our body, as well as allow us to guide the motion of our hand to shoo it away. Multisensory processing might occur at different levels: we found that combining tactile and visual stimuli (summation condition) led to a general enhancement in perception, while a different technique (facilitation) revealed direction specific improvements in perception, indicating early sensory interactions. Moreover, in certain circumstances, multisensory integration may not be achieved until the age of 10. Before this age, the noise in precision during active movements increased by double compared to passive ones. To overcome this, we propose that, before multisensory integration occurs, a cross-modal calibration process in which the most reliable sense calibrates the others is necessary. Evidence are obtained by exploring the impact of a lack of visual calibration, essential modality in space representation, on the tactile perception in passive and active conditions. By testing blind and sighted individuals, we found a diminished tactile reliability in the former group during active touch. When auditory stimuli were combined with tactile ones, while blind participants were only affected by the movement, the active touch noise made sighted participants vulnerable to the interference of the sound. These findings support the role of cross-modal calibration as pre-requisite for an efficient multisensory processing as well as in shaping our perceptions.

Keywords: Audio, Blind, Tactile, Vision
Presentation type: Oral presentation / Talk
Session: Touch perception: From Unisensory to Multimodal

The influence of (explainable) AI-enabled advice on decision-making in a personnel selection task

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The use of AI-enabled decision support systems for personnel selection is on the rise. However, users' understanding of the technology's underlying processes is often limited, combined with low user acceptance and trust. Explainable AI-enabled systems offer a solution to mitigate this discrepancy by providing additional information to recipients. By simplifying their outputs or reducing the complexity of the underlying AI model, explainable AI-enabled systems make their operations easier to understand. In our study with N = 328 participants, we investigated how the *type of advice* (no advice vs. AI advice without explanation vs. AI advice with visualized explanation) and the *accuracy of advice* (80% correct advice) impacted decision performance, perceived advice quality, and participants' confidence in their decision in a personnel selection task. In line with our hypothesis, receiving correct advice had a significant positive effect on the performance, the advice quality and participants' confidence in their decision. Against our hypothesis, explainable advice resulted in non-significant effects. The results show that the quality of the AI system had a strong impact on participants' performance. However, providing AI advice along with visual explanations for its prediction did not help the participants to recognize incorrect advice more easily. As we did not find a simple solution to reduce overreliance in incorrect advice, further implications are discussed.

Keywords: Decision-making, Advice Taking, Explainable AI, Human-AI-Interaction, Personnel Selection
Presentation type: Oral presentation / Talk
Session: AI and decision-making: Insights from varied applied settings

Simultaneous Item Presentation Facilitates Children's Clustering in Free Recall

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Category clustering is a strategy that is often used in free-recall tasks with semantically related items. Age differences in recall performance have been shown to be attributable to age differences in learning to cluster (Horn et al., 2021; Michalkiewicz et al., 2020). Theories of memory development predict age differences in the use of support for category clustering (Flavell, 1970). We hypothesized that simultaneous item presentation would support clustering in children. We presented 45 seven-year-old children, 30 ten-year-old children and 60 young adults with 36 stimulus pictures that were clusterable in pairs on semantic grounds, followed by free recall. The two stimulus pictures from the same category were presented either simultaneously or sequentially on a computer screen. Using multinomial processing tree modelling (Batchelder & Riefer, 1986), we disentangled cluster encoding, cluster retrieval, and singleton recall. Results showed that presentation mode affected cluster encoding. Simultaneous presentation, compared to sequential presentation, led to higher probability of cluster encoding in all age groups. Cluster retrieval or singleton recall was not affected by presentation mode. Simultaneous presentation may facilitate encoding as clusters by enhancing common feature identification of category information (Carvalho & Goldstone, 2014). Implications regarding theories of memory development are discussed.

Keywords: category clustering, episodic memory, free recall, middle childhood, multinomial modeling, cognitive development
Presentation type: Poster Presentation
Session: Memory and Learning II

Exploring the potential role of flexible (un)binding in dynamic task-set regulation

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One of the hallmarks of humans' cognitive flexibility is the ability to dynamically adjust and control our intentions and actions in fast-changing environments. Our previous work has demonstrated that people are able to dynamically modulate task preparation when the to-be-performed task varied in uncertainty, across a series of behavioral experiments (Chai et al, 2023). However, the cognitive mechanisms underlying this uncertainty-driven regulation of task preparation remains unknown. Here, we investigated whether people actively prepare and regulate task representations as a whole, requiring time-consuming unbinding processes when a partially overlapping task had just been prepared for, or, on the other hand, whether task preparation occurs in a more componential manner, benefiting from previous task preparation when a partially overlapping task had been prepared for. In the current study, we aimed to distinguish these two equally plausible mechanisms by designing a variant of the original Task Transformation paradigm with two experimental conditions. In one condition, the task varied in uncertainty as a whole. In the other condition, the uncertainty only affected the task partially. By comparing the behavioral pattern between these two conditions, we can have a first glimpse at people's preferred strategy when navigating through an uncertain task environment. Our result holds the promise to draw critical implications for cognitive flexibility in a multi-task environment in tandem with a compositional task structure, in which the flexible (un)binding between task elements becomes imperative.

Keywords: cognitive control, decision making, feature binding, control dynamics, compositionality, task switching
Presentation type: Oral presentation / Talk
Session: Feature binding in action control and beyond I: How binding contributes to stimulus-response learning, cognitive control, and event segmentation

The sense of agency as active causal inference

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Rikkyo University

This study delves into the active aspect of the sense of agency (SoA), often underrepresented in literature, positing it as an active causal inference outcome concerning one's actions and their environmental impact. Participants engaged in computer-mouse-driven tasks, designed to evaluate their control or recognition of controlled visual objects amidst varying noise levels. Our findings indicate that participants actively crafted high-level, low-dimensional action plans, unique yet consistent within individuals, to deduce their control level in a noisy environment. Utilizing transformer-LSTM-based autoencoders, we quantified these action plans, revealing that their geometrical and dynamical attributes could significantly predict task-related behavioral profiles. This implies that participants' sense of control is molded by actively modifying action plans, which are seen as tools for generating causal evidence via intervention. Additionally, participants actively broadened their action plan diversity, as indicated by the action plan distribution's dimensionality. This approach promotes exploration of potential action plans while simultaneously gathering causal evidence for inference. Contrastingly, schizophrenia patients showed lesser action plan diversity, hinting at diminished active control inference and weaker self-relevant cue detection. However, their judgment responses were in line with predictions based on the geometrical and dynamical features of their action plans, suggesting they adjust their decision-making boundaries to enhance their active causal inference regarding environmental changes. These insights contribute to a richer understanding of SoA, underscoring its roots in active causal inference.

Keywords: sense of agency, active inference, causal inference, deep learning, autoencoder, schizophrenia
Presentation type: Oral presentation / Talk
Session: Sense of agency in action: The influence of control experience on goal-directed behaviour

Whether egocentric or allocentric, spatial representations must fit the bill

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Deciphering what kind of reference frames agents use for spatial navigation requires an understanding of, first, the spatial navigation processes they employ and, second, what representations and computations these processes require from a normative perspective. In my talk, I will introduce a refined taxonomy of mammalian spatial navigation, building on the taxonomy of Franz & Mallot (2000), and insights from computational modeling. Our taxonomy better accounts for mammalian behavior and neural recordings, and highlights that different navigation processes require very different kinds of representations and computations. These requirements determine whether ego- or allocentric reference frames will be more useful. In our reinforcement learning (RL) model of aiming and guidance behaviors, the agent overwhelmingly prefers egocentric actions for aiming and allocentric actions for guidance, when given a choice. Intriguingly, when constrained to use the nonpreferred action space, the RL agent can efficiently learn to navigate. However, these agents have more limited generalization capabilities than agents using the preferred action space. Furthermore, we demonstrate in a spiking neural network model of guidance that an efficient coding of space, in the sense of Fisher information, facilitates spatial learning. In summary, our findings underscore the critical role of spatial representations for the performance and learning of spatial navigation. The emergence of ego- and allocentric spatial representations is intimately linked to the specific task demands and affects the efficiency and versatility of spatial navigation.

Keywords: spatial navigation, reinforcement learning, neural networks, hippocampus, taxonomy
Presentation type: Oral presentation / Talk
Session: Egocentric and allocentric reference frames: Integrating across measures, task complexity, and spatial scales

Does emotional valence affect intelligibility of speech in noise?

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In two experiments, we investigated, whether the intelligibility of spoken words in noise is modulated by their affective valence. In Experiment 1, participants listened to words of semantically positive, neutral, or negative valence pronounced by a neutral voice and masked by speech-spectrum noise. The task was to write down as much as they understood of each 4-syllable word combination. Accuracy was significantly higher for positive and negative word combinations compared with semantically neutral word combinations. In Experiment 2 (data collection in progress) , we investigated, whether speech intelligibility is equally affected, if formerly (semantically) neutral words take on an affective valence due to evaluative conditioning (EC). Three 4-syllable word combinations spoken each by one of three different neutral voices were paired with positive, neutral, or negative images during an EC-phase. The word combinations spoken by the assigned voice were rated before and after the EC-phase, showing evidence of successful evaluative conditioning. Afterwards, participants completed the same task as in Experiment 1, thus permitting to assess the effects of experimentally manipulated valence on speech intelligibility (a) for the formerly neutral words, and (b) for the three voice timbres consistently paired with negative, neutral or positive images.
Keywords: evaluative conditioning, speech intelligibility, valence
Presentation type: Oral presentation / Talk
Session: Current Developments in Evaluative Conditioning: Methodologies, Mechanisms, and Manifestations

Learning-Induced Plasticity Enhances the Capacity of Visual Working Memory

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Visual working memory (VWM) is limited in capacity, though memorizing meaningful objects may refine this limitation. However, meaningful and meaningless stimuli typically differ perceptually, and objects' associations with meaning are usually already established outside the laboratory, potentially confounding experimental findings. Here, in two experiments with young adults (N = 45 and N = 20), we controlled for these influences by having observers actively learn associations of (for them) initially meaningless stimuli: Chinese characters, half of which were consistently paired with pictures of animals or everyday objects in a learning phase. This phase was preceded and followed by a (pre- and postlearning) change-detection task to assess VWM performance. The results revealed that short-term retention was enhanced after learning, particularly for meaning-associated characters, although participants did not quite reach the accuracy level attained by native Chinese observers (young adults, N = 20). These results thus provide direct experimental evidence that participants' VWM of objects is boosted by them having acquired a long-term memory association with meaning.
Keywords: visual working memory, memory capacity, change detection, long-term memory, familiarity, object knowledge
Presentation type: Oral presentation / Talk
Session: Working Memory

Here today – gone tomorrow: Statistical learning and adaptation after target location changes in natural scene contexts

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Attentional orienting in complex visual environments is supported by statistical learning of regularities. For instance, visual search for a target is faster when a layout of nontargets is repeatedly encountered, illustrating that learned contextual invariances improve attentional guidance (contextual cueing; Chun & Jiang, 1998). Contextual learning is usually relatively efficient, but relocating the target (within an otherwise unchanged nontarget layout) typically abolishes contextual cueing, revealing only a slow recovery of learning (Zellin et al., 2014). While these studies usually employed artificial search displays with target and nontarget letters, the current study used more realistic natural scene contexts to determine whether a comparable lack-of-adaptation effect would also be evident in real-life contexts. Two experiments compared initial contextual cueing and the subsequent updating after a change in displays that either presented artificial letters, or natural scenes as contexts. With letter displays, an initial cueing effect was found that vanished after the change, thus replicating previous work. Natural scene displays showed a comparable reduction of cueing, which, however, depended on the size of initial learning: When the repeated scenes were explicitly recognized, contextual cueing revealed a large benefit, which attenuated costs associated with the change. By contrast, when scene-based cueing revealed non-explicit, incidental learning, the initial benefit turned into a cost - comparable to the pattern in letter displays. Together, these findings show that awareness about the repeating contexts is crucial to remedy costs after unexpected changes, while the “richness” of natural scene contexts themselves do not improve flexible contextual updating.

Keywords: visual attention, visual search, statistical learning, contextual cueing, natural scenes, context adaptation
Presentation type: Oral presentation / Talk
Session: Natural Scene Perception

Does working memory capacity and auditory filtering account for age differences in irrelevant sound effects?

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Health and Medical University

According to the duplex-mechanism account of auditory distraction, disrupted short-term memory can be the result of either attentional capture or interference-by-process. The auditory deviation effect is associated with diversion of attentional resources, which should be largely independent of task demands. In contrast, the changing-state effect is supposed to be due to interference between automatic processing of acoustic changes (during auditory scene analysis) and deliberate serial-order processing. While the deviation effect was found to be associated with individual working memory capacity, short-term memory disruption due to changing-state sound may be related to the efficiency of an auditory filter mechanism. In this study, we test whether the deviation effect is associated with working memory capacity, whereas the changing-state effect is related to auditory filtering. Furthermore, evidence of age differences between the two forms of auditory distraction remains inconclusive. We aim to investigate the relationship between age and both forms of auditory distraction. Therefore, young (18 to 30 years) and older adults (>60 years) were presented with different types of irrelevant speech while remembering the serial order of visually presented digits. Both working memory capacity and auditory distractor filtering were measured before the serial recall task. Consistent with previous findings, working memory capacity was correlated negatively with the size of the deviation effect. Participants' age group moderated the relationship between working memory capacity and the deviation effect. In contrast, auditory distractor filtering was related to the changing-state effect, but age differences did not account for this relationship.

Keywords: working memory capacity, auditory distractor filtering, irrelevant sound effect, deviation effect, changing-state effect, age differences
Presentation type: Poster Presentation
Session: Memory and Learning II

Category-selectivity, again: Hand-selective clusters in visual cortex support action-related behavioural goals

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The occipitotemporal cortex (OTC) contains areas that preferentially respond to specific object categories like body parts and tools, with a mirrored organization across its lateral and ventral parts. However, the exact role of these areas in supporting action or object recognition is still debated. Here, we investigate the selectivity and the multivariate representations of these selective clusters. We analysed an fMRI dataset in which participants were presented with images characterized by a different degree of action properties of either body parts (hands, whole-bodies, and faces) or objects (tools, manipulable objects, and non-manipulable objects). To test selectivity in OTC, we adopted a vector-of-ROI approach (Konkle & Caramazza, 2013), in which we created and extracted the activations from a series of partially overlapping spheres covering lateral and ventral OTC. Left lateral OTC exhibits a dorsal-posterior to ventral-anterior topographically organized action gradient, with selective and partly overlapping activations for bodies, hands, tools, and manipulable objects, and a selective overlap between hands and tools; left ventral OTC contains activations for hands distinct from the activations to faces and bodies. To further characterize this action gradient, we computed an action index capturing specific action-related components in OTC representational space. This revealed that the action-related activation gradient was reflected at the level of multivariate representations only in hand-selective clusters in both left lateral OTC and ventral OTC. Altogether, our results show that the object space in hand-selective visual cortex reflects action-related behaviourally-relevant dimensions, and suggests future paths to generate a computational model of this object space.

Keywords: Category-selectivity, Vision, fMRI
Presentation type: Oral presentation / Talk
Session: Cognitive and Neural Processes Underlying the Perception of Actions, Scenes and Objects I

Body odors

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Human interaction is characterized by how we perceive each other, and our perception is decisively determined by the consciously and unconsciously emitted signals. Body odor is one signal that provides information about the other person – from eating habits, age, menstrual cycle, or inflammation status to current emotionality. This talk sheds light on the olfactory communication between sender and receiver, delineates how body odors change over the life span, which acute stresses are reflected in body odors, and how this changes the chemical composition of the odor-active volatiles.

Keywords:
Presentation type: Oral presentation / Talk
Session: Cognitive and Neural Processes Underlying the Perception of Odors

The role of insecure attachment, sexual motivation and sexual functioning in pornography consumption.

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Because of the accessibility of visual sexual stimuli, millions of users are attracted to consume pornographic contents. Attachment, motivation, and sexual functioning are all integrative parts of adult sexual activities such as pornography consumption. The research aimed to determine how sexual motivations, sexual functioning, and attachment styles can influence the frequency of pornography use and how the consumers differ. To investigate these relationships a total of 785 Hungarian adult participants (547 women and 238 men, mean age=33.7) completed our online survey comprising self-report measures. The test battery included demographical questions and the Hungarian versions of Reasons for Having Sex Questionnaire short form (YSEX?-15H) to measure the sexual motivations, the Sexual System Function Scale (SSFS) to measure the hyper- or deactivation of sexual system, the Experience in Close Relationships-Relationship Structures (ECR-RS) to measure insecure attachment, and the short version of the Problematic Pornography Consumption Scale (PPCS-6). Subsequent analysis revealed that sexual deactivation mediates the predictive power of attachment avoidance on the frequency of pornography use. Furthermore, attachment anxiety effects pornography consumption indirectly by the mediator role of participating in sexual activities for attaining personal goals. Those who are characteristic of having problem with pornography use are more likely to be males, to participate in sexual activities for personal goals and for coping, to attach insecurely, and to be sexually hyperactivated. Our research contributes to a better and deeper understanding of the phenomenon of pornography consumption and the results may have implications for professionals helping people with pornography addiction.

Keywords: pornography consumption, frequency, problematic, sexual motivation, sexual functioning, attachment style
Presentation type: Poster Presentation
Session: Clinical and Biological Psychology

Does ego depletion play a role regarding the attitudes and behavior towards sustainable food consumption?

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The individual human behavior is seen as a significant contributor to the current socioenvironmental crisis. Among others, food consumption and the relating psychological factors play an important role in sustainable individual consumption behavior. One of these psychological factors is self-control. The main goal of the study was to investigate the effect of ego depletion, a state with no self-control resources available, on explicit and implicit attitudes and behavior towards sustainable food consumption within the framework of dual-process models describing sustainable behavior. A total of 171 participants completed an explicit rating task and an affective priming task before and after a six-minute transcription task intervention to induce ego depletion. Subsequently, participants conducted a decision-making task involving a choice between a sustainable and a less-sustainable chocolate bar to assess actual sustainable behavior during a state of ego depletion. The results showed that the explicit attitudes towards sustainable nutrition did not become more negative in the depletion group compared to the control group contrary to our initial expectation. However, unanticipated time-based changes in implicit attitudes towards sustainable nutrition were observed. Furthermore, the depletion group did not act dependent on their implicit attitudes towards the chocolate bars in the decision-making task. Although this study does not provide the expected effect of ego depletion on explicit and implicit attitudes to describe sustainable behavior, particularly vegetarian nutrition, it suggests, regarding dual-process models, that reflective type-2 processes are the predominant influence on explaining and describing sustainable behavior compared to affective type-1 processes.

Keywords: Ego Depletion, Self-Control, Explicit Attitudes, Implicit Attitudes, Vegetarian Nutrition, Sustainable Behavior, Dual-Process Models
Presentation type: Poster Presentation
Session: Human Factors II

Attention to Actions – a behavioral study

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The ability to identify the actions performed by others is a vital human skill that depends on the effective allocation of limited brain resources to prioritize attended targets. This experiment aimed to reveal whether top-down preparation plays a facilitatory effect in the identification of basic action categories depicted as static images. We hypothesized that prior information about the action category of the target image through a word cue (climb, jump, run, or walk) would improve identification performance. We employed a within-subject design, incorporating the factors *cue validity* (valid, invalid, and non-cued) and *action category* (climb, jump, run, walk), with a ratio of 3:1 between valid and invalid trials. A two-factorial repeated-measures analysis of variance (ANOVA) for the factors *cue validity* and *action category* revealed that participants responded faster and more accurately in the valid condition in comparison to the invalid and the non-cued condition. To ensure that we were not cueing any specific motor association, we carried out a control experiment, in which the assignment between response keys and action categories was randomized for each trial. The control experiment confirmed the facilitatory effect of the cue, with faster and more accurate responses in valid in comparison to non-cued trials. These findings highlight the role of category-based attention for efficient action identification. The semantic category of an upcoming action enables the pre-activation of pertinent visual action representations, prioritizing them over irrelevant actions. This, in turn, facilitates the visual processing of specific action instances when they align with the cue.

Keywords: Behavioral study, Action identification, Attention, Cues.
Presentation type: Poster Presentation
Session: Attention

A new model of insight as non-monotonic problem solving

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Insights represent cases of problem solving that involve a sudden reorganization of the mental problem representation, yielding a nonobvious or nondominant interpretation (Kounios & Beeman, 2014). While the field has profited from a recent surge in empirical studies as well as from new methodological approaches, a unifying theory is still missing. As a first step towards this goal, a new theoretical model of insight problem solving is presented that differentiates between monotonic (analytical) and non-monotonic (insightful) problem solving. The model conceives insight as a process with two key components: On the cognitive side, sudden changes ("restructuring") in problem representations are involved (Knoblich et al., 1999), while the affective component consists of a strong emotional response, the so-called "Aha! experience" (Wiley & Danek, in press). Empirical evidence is provided for model assumptions such as the relationship between sudden restructuring and Aha! experiences, the existence of false insights, and weaker Aha! experiences for monotonic problem solving. This model provides a comprehensive framework for future research, independent of task domain.

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Knoblich, G., Ohlsson, S., Haider, H., & Rhenius, D. (1999). Constraint relaxation and chunk decomposition in insight problem solving. Journal of Experimental Psychology: Learning, Memory, and Cognition, 25(6), 1534–1555.
Kounios, J., & Beeman, M. (2014). The cognitive neuroscience of insight. Annual Review of Psychology, 65(1), 71–93.
Wiley, J., & Danek, A. H. (in press). Restructuring processes and Aha! experiences in insight problem solving. Nature Reviews Psychology.

Keywords: insight, problem solving, restructuring, metacognition
Presentation type: Poster Presentation
Session: Metacognition

The role of working memory in training-related improvements of task-order coordination mechanisms

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In dual-task (DT) situations, effective task-order coordination (TOC) is vital for scheduling bottleneck-processing of component tasks, as evidenced by recent observations indicating increased TOC costs in DT situations when comparing variable to fixed orders of component tasks. Our prior work showcased improvements in these processes through the practice of two temporally overlapping tasks with variable presentation orders. This study delves into the underlying mechanisms, specifically exploring the role of working memory (WM) in these enhancements.
Participants practiced the same two visual-manual component tasks with variable order within three distinct groups. They either trained the two tasks with an additional high WM load task, an additional low WM load task, or without any extra task. Pre- and post-training sessions compared TOC costs across these groups, considering situations with unchanged and untrained stimuli to assess stimulus-unspecific training-related improvements.
Results indicate enhanced TOC (i.e., reduced TOC costs) for participants who trained without an additional task, consistent with prior findings. Conversely, participants faced with an additional task taxing WM capacity failed to achieve improved TOC. Notably, the low WM load group demonstrated enhanced performance, highlighting that the mere addition of a task did not drive this outcome.
These findings align with the Efficient Task Instantiation (ETI) model, suggesting that practicing the flexible adaptation of processing orders for two component tasks in DT scenarios can lead to efficient, conjoint instantiation of both potential task orders in working memory. This higher-order, stimulus-unspecific instantiation facilitates effective task-order scheduling, independent of the specific stimuli presented.

Keywords: dual-tasks, training, task order coordination, working memory
Presentation type: Oral presentation / Talk
Session: Multitasking and Cognitive Control I

“Mild” Matters: Decoding Disease Severity Labels and Its Impact on Risk Perception and Protective Behavior Across Illnesses

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When describing the severity of illnesses, terms such as “mild”, “severe”, or “critical” are commonly used in medical and public health communication. During the COVID-19 pandemic, these terms served as labels to classify potential health risks and communicate them to the general public. However, severity labels might not always be accurately interpreted. Individuals encountering the term “mild” could, e.g., underestimate the potential severity of the disease, reducing the likelihood of adopting protective measures. Drawing inspiration from meteorological risk communication, we employ an "impact-based" approach. This method assumes that providing information about which symptoms are classified, e.g., as “mild” or “severe”, could lead to a more accurate assessment of the (potential) threat. In an online study, we examine how people generally interpret disease severity labels. Participants match a variety of symptoms typically associated with respiratory diseases to what they believe is the appropriate severity category. Moreover, in a 2x2 experimental design, we investigate how providing a list of possible symptoms in addition to the severity label vs. presenting the label only (factor *information*) influences perceived risk of a disease and the likelihood to take up protective measures against it. Furthermore, we explore how previous knowledge and susceptibility beliefs about diseases influence the effects by comparing a condition in which we describe the disease as a “Respiratory Disease” to a neutral condition with a fictious disease called „Avirconie“ (factor *disease*).

Keywords: COVID-19, risk communication, public health, risk perception, disease severity
Presentation type: No-Data Poster
Session: Clinical and Biological Psychology

Investigating the Role of Cognitive Style in Route Learning from Maps

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Cognitive Style (CS) is found to play roles in map reading and navigation. The current study aimed to investigate if Visual-Verbal CS plays a role in route learning from maps and navigating the memorized route in a virtual environment. In two experiments, participants memorized predetermined routes on the maps. Experiment 1 explored whether the way individuals remember the routes is affected by their CS. We tested route memory with three different tasks, each favoring one of the three CS dimensions. We hypothesized that each CS dimension would predict its respective task performance. However, none of the CS dimensions significantly predicted route memory in their corresponding task. In Experiment 2, the test was to navigate the memorized route within a virtual environment. Participants learned the route information in the allocentric format (from a map), and their memory of the route was tested in the egocentric format (route navigation). Building on the findings of Experiment 1, we aimed to investigate if the Visual Verbal CS affects the perspective switch (from allocentric to egocentric) required in the current task. Only the Spatial-Visual Cognitive Style dimension (SVCS) predicted the performance (R^2= .1, p = .001) with higher SVCS scores corresponding to fewer navigation errors. However, this effect disappeared when the perspective-taking ability was controlled. Those with higher perspective-taking ability scored higher in the SVCS dimension and performed fewer navigation errors. Overall, with the current methods applied, we can conclude that Visual-Verbal CS does not significantly impact predefined route learning from maps.

Keywords: route learning, navigation, cognitive style, wayfinding, map reading, spatial perspective taking, spatial reference frames
Presentation type: Poster Presentation
Session: Memory and Learning I

Relation between functional connectivity, anterior cingulate cortex glutamate, and the overweighting of language priors in healthy individuals with psychotic-like experiences

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The glutamate hypothesis of schizophrenia proposes that the dysfunction in the glutamatergic neurotransmitter system, particularly involving N-methyl-d-aspartate(NMDA)-receptor hypofunction, is linked to the pathophysiology of schizophrenia. Previous studies also showed that alterations in the primary excitatory neurotransmitter, glutamate, are linked to brain functional connectivity. Furthermore, the NMDA-receptor hypofunction is hypothesised to underlie abnormalities in the framework of predictive coding. This Bayesian inference theory implicates that an overweighting of prior beliefs underlies the formation of hallucinations in schizophrenia. However, the interplay of molecular biology, functional connectivity and underlying neurocomputational mechanisms for psychosis remains still unclear.
Using magnetic resonance spectroscopy (^{1}H-MRS), functional magnetic resonance imaging (fMRI) and a language prediction task, we investigated this relationship between glutamate concentrations in the anterior cingulate cortex (ACC) and the left dorsolateral prefrontal cortex (lDLPFC), functional connectivity (FC) and psychotic-like experiences (Schizotypal Personality Questionnaire) in 53 healthy individuals (26 women). We conducted a seed-based connectivity analysis, using the ACC and the lDLPFC as the seeds of interest for two separate analyses. We then investigate associations between FC, language task parameters, subclinical scores and glutamate levels in linear regression models.
Preliminary results show that ACC glutamate and prior overweighting predict the connectivity strength of the ACC. Therefore, this study proposes that molecular biology, functional connectivity and neurocomputational mechanisms may interact to develop psychotic-like experiences, and could potentially serve as a promising indicator for identifying individuals at an early stage.

Keywords: resting-state connectivity, glutamate, psychotic-like experiences, language prediction
Presentation type: Oral presentation / Talk
Session: Clinical Psychology

Somatosensory omissions reveal action-related predictive processing

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The interplay between action and somatosensory perception has been a focal point of research over the past decades. Generally, a forward model has been posited to predict the somatosensory outcomes of actions, suggesting that the unexpected absence of tactile feedback during action should give rise to prediction errors. While such omission responses have been documented in the auditory domain, it remains unclear to what extent this mechanism generalizes across different sensory modalities.
This study aimed to investigate action-induced somatosensory omission responses through EEG recordings in a total of 30 human subjects. Self-paced button presses were associated with somatosensory stimuli in 88% of trials, enabling a prediction of the stimulus, or in 50% of trials, precluding such prediction. In the 88% condition, the absence of the predicted stimulus evoked a complex neural response consisting of multiple components, which was unveiled through temporal principal component analysis.
The initial oN1 response indicates sensory sources similar to stimulus-evoked activity but originating outside the primary cortex. Subsequent oN2 and oP3 responses were similar to observations in the auditory domain, likely signify higher-order, modality-unspecific processes. Together, findings straightforwardly demonstrate somatosensory predictions during action and provide evidence for a partially modality-unspecific mechanism of prediction error processing.
Keywords: EEG, omission, predictive coding, somatosensory, action, prediction
Presentation type: Poster Presentation
Session: Motor and Action Control

Psychobiological mechanisms of pain relief as reward

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When in pain, pain relief can become a predominant goal. The desire for pain relief is a potent motivator that directs behavior to escape from or reduce potentially harmful stimuli. While the crucial role of pain – at least acute pain – for survival has been widely acknowledged, the rewarding and motivating nature of pain relief has received much less attention. It has been shown that pain relief when perceived as result of active decision making is endogenously enhanced compared to passive receipt of the same nociceptive input, but mechanisms of such effects remain poorly understood. Further, although impaired reward processing has been implicated in the development and maintenance of chronic pain, the exact relationships of exaggerated pain perception and altered reward learning have rarely been tested. We used a probabilistic relief-seeking task to investigate the modulation of pain relief when received as a reward and its role in learning by negative reinforcement. To characterize the underlying psychobiological mechanisms of this modulation we probed the roles of dopaminergic and opioidergic signaling, both of which are implicated in relief processing. Furthermore, we compared relief modulation and effects of reinforcement learning between participants with and without chronic pain. The results indicate that dopaminergic signaling has a key role in modulating the perception of pain relief. The motivationally driven enhancement of pain relief perception appears to be spared by maladaptive changes during pain chronification. These results highlight the important role of motivation and prospective control of behavior for endogenous modulation pain relief.

Keywords: pain relief, reinforcement learning, chronic pain, psychobiological mechanisms
Presentation type: Oral presentation / Talk
Session: Psychological factors in chronic pain: Recent experimental results

Neural dissociation of different referential processes in discourse comprehension: An fMRI study

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Successful discourse comprehension relies on reference to the previous discourse context and sometimes requires pragmatic inference from the global semantic meaning of the discourse. We used functional magnetic resonance imaging (fMRI) to investigate which brain regions are involved in reference processes under different circumstances.
To investigate reference processes, we presented short German discourses containing fulfilled and unfulfilled presuppositions, triggered by a definite or indefinite noun phrase. In one set of sentences, a contextual referent was explicitly mentioned as existent (e.g., “a rope”, in German “ein Seil”) or negated (“no rope”, in German “kein Seil”) in a context close or far away from the triggering noun phrase (*memory context*). In another set of sentences, a referent was not explicitly mentioned in the context, but an inference to a referent was either plausible or implausible due to contextual semantic relations (*inference context*). After listening to the spoken discourse, participants were asked to rate the coherence of the discourse.
Brain activation patterns showed that different areas were involved in the two different context conditions. In the memory condition, areas associated with phonological processes (e.g., supramarginal gyrus) and attention (e.g., insula / putamen) were active, whereas in the inference condition, areas associated with semantic processing (middle temporal gyrus) and episodic memory (fusiform gyrus / parahippocampus) were active. Taken together, our data show that discourse references in different contextual situations involve different brain areas and help to identify the neuronal network responsible for semantic and pragmatic discourse comprehension.

Keywords: Discourse comprehension, presupposition, coherence, inference, semantic, pragmatics
Presentation type: Poster Presentation
Session: Language

Do emotional stimuli drive controlled behavior in conflict tasks?

David Dignath
University Tübingen

Emotions have a bad reputation among scholars of cognitive control. Clearly, emotions can be powerful distractors that challenge controlled behavior. Not surprisingly, theoretical accounts often describe emotions as antagonists to controlled behavior. In this talk, I will focus on a different perspective, suggesting that emotions have a signaling function, because they are both output and input for controlled processes. I will present meta-analytic data addressing this controversy by means of experimental manipulations of affect on cognitive control in conflict tasks (Stroop, Simon, flanker). Results of two primary meta-analyses found no clear evidence that emotional stimuli modulate cognitive control in general. Yet, moderator analysis suggested that specific aspects of the task, stimuli, and testing conditions show enhanced control with emotional stimuli. Based on this moderation, I will discuss how different theoretical positions on the emotion-control interface might be reconciled.

Keywords: emotion, cognitive control, congruency effect, Stroop, affect
Presentation type: Oral presentation / Talk
Session: Affect, motivation and control I

Feeding the Mind: How Satiety Modulates Modal and Amodal Cognitive Control

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This study delves into the influence of satiety on cognitive control (our thoughts and actions) and its implications for food-related behaviors. While previous research predominantly talked about the cognitive ramifications of hunger, in this study, we are reforming the spotlight on how we react when we are comfortably full. According to Cohen's small-size effect, the sample will be 216 volunteers. We will measure each participant's reaction time on the stop signal task, showing neutral valence words and pictures (food pictures-modal, food words-amodal, neutral pictures-modal, neutral words-amodal).
Expected outcomes include predictions that satiated individuals have lower inhibitory control (longer SSRT), no matter what the words or pictures are about. Furthermore, we hypothesize that there is no significant difference when individuals are satiated on inhibitory control regardless of visual and verbal stimuli (content-wise). Additionally, we are interested in examining whether the impact of satiety on inhibitory control is consistent across different types of neutral stimuli regardless of their format.
The statistical analysis will involve repeated measure ANOVA to examine the main effects and interactions of stimulus type and content on stop signal reaction times. Post hoc analysis will be used to determine the significant findings in detail.
Our study objective is to focus on how feeling satiety influences our brain control process and helps provide us with a better understanding of our eating behaviors and develop strategies to help people with eating disorders.

Keywords: Satiety, Cognitive Control, Inhibitory Control, Stop Signal Task, Reaction Time, Eating Behaviors, Eating Disorders
Presentation type: No-Data Poster
Session:

Tracking the preparatory activation of target templates for visual search with high temporal definition

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In visual search, efficient selection of task-relevant objects depends on foreknowledge of their defining characteristics. Internal representations of these features comprise "attentional templates", which bias attentional processing towards template-matching sensory signals, thereby promoting adaptive top-down selectivity. To proactively facilitate the detection and identification of target objects, target templates are assumed to become activated in advance of an up-coming search episode. However, an immediate neural signal for such preparatory template activation processes has yet to be discovered, so their existence remains elusive. Here, we introduce the high-definition rapid serial probe presentation paradigm (RSPP-HD) – a method we recently developed to track target template activations in real time via monitoring of the N2pc component. In the RSPP-HD procedure, a series of task-irrelevant probe displays are presented at regular intervals during the period between successive task-relevant search displays. When a corresponding target template is active, lateralised probe stimuli including the target defining feature are expected to attract attention and elicit an N2pc, thereby tracking the temporal profile of preparatory template activation processes. To limit-test the temporal resolution with which such template-guided attentional shifts can be traced, between-probe SOA's of 50, 100, and 200 ms were evaluated. Our findings demonstrate that the preparatory activation of target templates can be reliably monitored at higher sampling frequencies than previously achieved, without running the risk of confounding template-guided and salience-driven attentional shifts. The RSPP-HD paradigm therefore provides a viable means to approach various unanswered questions regarding the content and temporal dynamics of attentional templates for visual search.

Keywords: Attentional Selection, EEG, N2pc, Attentional Templates
Presentation type: Poster Presentation
Session: Attention

The role of active exploration in the visual perception of material qualities

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Giessen University

Image motion conveys crucial information about material properties (e.g. Doerschner et al. 2011, Paulun et al. 2017), and motion signals are generated for instance, when we actively explore and manipulate an object: we tend to indent soft things, run our hands through sand or stroke fuzzy plush. Little is known about how this active exploration affects how a visual material quality is perceived, or conversely, if visual material properties modulate the exploration process. We investigated these questions using a novel active exploration paradigm in Virtual Reality combined with real-time hand tracking in an experiment where participants had to either match the glossiness or the lightness of a novel-shaped object to a reference scale. Participants could either move the object with their hand or look at it passively while forming their judgments. In the analysis, we contrasted 1) perception between passive and active conditions and 2) the time spent and the amount of exploring between the two material judgments tasks. We found that participants (N=20) differed in exploration behaviors between the two perceptual tasks: during gloss judgments, they explored objects longer and to a greater extent, than during lightness judgments. A potential explanation of the increased exploration could be that participants actively produced highlight motion, which would lead to a more robust estimate of glossiness. The found increase in perceived gloss in the active condition would be consistent with this interpretation. For the lightness task, we did not find perceptual differences perceived active and passive conditions.

Keywords: active exploration, material perception
Presentation type: Oral presentation / Talk
Session: Seeing, Thinking, and Acting in a Physical World

"Do we perceive the physical structure of the world?: A case study of a fallling object"

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Bayesian theories of visual perception postulate that the brain infers from retinal images the accurate spatiotemporal properties of physical events by combining noisy sensory information with prior knowledge of environmental properties, such as Newtonian laws of motion. We tested this general assumption with a study where participants observed the trajectory of a ball rolling off a surface. We simulated this dynamic event in virtual reality: participants viewed a marble-sized ball fall towards them from a tabletop. The ball disappeared upon hitting the floor. Their task was to simply indicate the remembered location where the ball fell by positioning a probe dot on the ground floor below the tabletop. There were two sources of visual information specifying the final location of the ball. First, the final location itself, which was perfectly visible to the participants, although for a very brief period. Second, the parabolic motion of the ball, which provided predictive information about the possible fall locations. Moreover, prior information about Earth's gravity could also have potentially improved the accuracy in the estimate of the ball's trajectory. Contrary to the predictions of Bayesian models, we found that instead of improving perceptual accuracy, adding sensory information of the ball's falling trajectory led to systematic biases in the judgement of its final location. Prior knowledge of Earth's gravity clearly influenced the perceptual judgements, but did not lead to improved accuracy. We explain these results with a new theory of cue integration termed Intrinsic Constrained that does not postulate accurate perception of physical events.

Keywords: visual perception, physics perception, motion in depth, cue integration
Presentation type: Oral presentation / Talk
Session: Seeing, Thinking, and Acting in a Physical World

Invariants of human behaviour revisited: Snapshot vs universal explanations in psychology

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The generality of psychological theories is sharply divided by the basic-applied distinction. While basic research aims to uncover universal invariants of human thought and behaviour independent of the current moment (How does memory work? How do people solve problems?), applied research aims to provide explanations to how people solve more proximal problems (How well do eyewitnesses identify suspects in a line-up? What are the best methods to help students learn in the modern-day classroom?). I will argue that much of what is currently considered basic research is in fact applied. To make this point, I will draw on evolutionary epistemology – the idea that evolutionary logic underlies every knowledge-generation process, including biological and cultural evolution, and human creativity. Under this view, the invariant processes that basic research should aim to explain are those that increase and decrease variance and effect change over time (like the mutation and natural selection processes of biological evolution). Basic psychological research today, on the other hand, typically focuses on what people do right now and, as such, provides only "snapshot" explanations – e.g., cataloging the current strategies for memorising things or solving math or logic problems. I'll outline a more promising way towards universal psychological theories.
Keywords: Experimental Psychology, Theories
Presentation type: Poster Presentation
Session: Methods

Schadenfreude After Vicarious Revenge: A Facial EMG Study

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Previous research showed that provoked participants are pleased by seeing the provocateur suffering from their retaliative punishment in a competitive game relative to not seeing them in pain, as indicated by increased activity of both the *zygomaticus major* (ZM) and the *orbicular oculi* (OO) muscles and decreased activation of the *corrugator supercilii* (CS) muscle. In the present experiment, we sought to take these findings further and investigate whether participants would have a similar smiling reaction when observing the suffering of their rival from vicarious punishment administered by a computer. As we expected, participants smiled (increased activation of both the ZM and OO muscles and decreased activity of the CS muscle relative to baseline activity) when seeing the provocative rival suffering from the punishment administered by a computer, which indicates a schadenfreude response. We did not observe such a smiling reaction among participants who witnessed their non-provocative rival suffering. Conversely, unprovoked participants mimicked the suffering of the non-provocative rival which suggests an empathic concern over a rival being undeservedly punished. Our findings emphasize the role of (un)deservingness in shaping one's emotional response to the suffering of others.
Keywords: aggression, empathy, deservingness, schadenfreude, suffering, facial electromyography
Presentation type: Oral presentation / Talk
Session: Facial Expressions II

Is metacognitive monitoring dependent on working memory? Experimental effects across development.

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Prior studies with adults indicate that individuals with lower working memory capacity make less accurate metacognitive monitoring judgements and that within one individual, monitoring accuracy suffers when working memory demands increase. This is suggestive of a dependent relationship between metacognitive monitoring and working memory in adults. In the current study, we asked whether the same relationship is observed earlier in development, and whether the nature of this relationship is stable across middle childhood. An experimental approach was taken in which the working memory demands of a task were manipulated and the impact on children's metacognitive monitoring accuracy was evaluated. The study had a mixed cross-sectional and longitudinal design, and the data indicate that children can also monitor their memory performance very effectively, with no developmental changes in relative monitoring accuracy. However, in contrast to the analogous adult data pattern, increased working memory demands did not lead to an impairment of monitoring accuracy in primary school-aged children. In fact, at the first assessment time point children showed higher monitoring accuracy when working memory demands were increased. This may reflect the qualitatively different processes involved in making monitoring judgements in childhood. It is anticipated that the results from the current study will provide novel insights into the nature of the relationship between working memory and metacognitive monitoring in development.

Keywords: Metacognition, Development, Working memory.
Presentation type: Oral presentation / Talk
Session: Recent Insights on the Basis, Accuracy, and Impact of Metacognitive Judgments

Gender Stereotypes and Mental Rotation in Preschoolers

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Research implicates spatial ability in science, technology, mathematics, and engineering (STEM). In both STEM enrollment and spatial cognition gender differences in favor of males are observable. Stereotyping may play an important role in this context. This study investigated gender stereotypes related to spatial ability in preschool children, representing the first exploration of implicit and explicit stereotypes and their potential association with spatial task performance in this age group. The participant pool comprised 138 children aged 4 to 6 years. The research design involved three main components: an implicit association task, a brief questionnaire assessing explicit stereotypes, and a chronometric mental rotation task. Results revealed that preschool children hold explicit gender stereotypes linking spatial ability more strongly to boys than girls, with boys exhibiting more pronounced stereotypes. Evidence of implicit stereotypes was found, though subgroup analyses did not consistently confirm their presence. While no clear correlation between stereotypes and mental rotation performance emerged, the study suggested that implicit stereotyping may impact mental rotation accuracy differently for girls compared with boys. The primary conclusion is that stereotypic beliefs about spatial ability are already present in preschool children, though no discernible relationship with actual spatial ability was observed at this early stage. The findings underscore the importance of addressing and challenging gender stereotypes in early childhood education.

Keywords: Spatial ability, gender stereotypes, human sex differences, preschool, children, mental rotation
Presentation type: Poster Presentation
Session: Perception III

Endocrinological, autonomic, and subjective stress responses of healthy adolescents by a virtual Trier Social Stress Test for Children compared to the real version

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The Trier Social Stress Test (TSST), the gold standard for inducing psychosocial stress in the laboratory, has been successfully transferred to a virtual setting in recent years. Whether the transferability using virtual reality (VR) also applies to a child version, the TSST-C, has not yet been evaluated. The aim of this study was to compare the multimodal stress response of a real and a virtual TSST-C. For this purpose, $N = 73$ healthy children and adolescents aged between 11 and 17 years were assessed. One group ($n = 37$) underwent a TSST-C in a real environment, the other group ($n = 36$) a TSST-C in a virtual environment. Salivary cortisol was collected as an endocrinological stress parameter, salivary alpha-amylase, heart rate, and heart rate variability as autonomic stress parameters, and subjective responses as psychological stress parameters. The experience in VR (presence) and possible negative effects (VR sickness) that could bias the stress response were also recorded. In addition, various parameters for the demographic and psychometric comparability of the groups were recorded and controlled. Significant differences between the groups in cortisol and subjective stress were identified, but not in the parameters of the autonomic nervous system. There was equivalence between the groups for alpha amylase. The participants' degree of presence had no significant influence on the experience of stress. The benefits and limitations of a virtual TSST-C are discussed.

Keywords: Trier Social Stress Test for Children, Virtual Reality, Stress, Cortisol, Adolescents, Alpha Amylase

Presentation type: Oral presentation / Talk

Session: Innovative methods for assessing emotion recognition, interoception and stress processing in children and adolescents

Episodic Binding of Approach-Avoidance Goals to Stimuli

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Appetitive and aversive stimuli are typically distinguished by their capacities to trigger approach- and avoidance-related action tendencies. We investigated whether approaching and avoiding stimuli creates episodic memory traces that are automatically retrieved when the stimulus is encountered again. Using a sequential distractor-to-distractor repetition paradigm, we hypothesized that distractor repetition from prime to probe trials will facilitate approach/avoidance to the probe target if the response is also repeated from prime to probe but will impede responding to the probe target if the response has changed. Results of four experiments (total N = 403) were in line with the hypothesized episodic binding and retrieval effect. A stimulus-cued retrieval of the previous approach and avoidance response was even obtained with different response sets and with perceptually different approach- and avoidance-related action effects in prime and probe trials. It is concluded that approach and avoidance action goals become linked to stimuli in an episodic memory trace and are automatically retrieved from memory when the stimulus is encountered again, which makes these stimuli appetitive and aversive.

Keywords: approach-avoidance motivation, stimulus-response binding, action control, episodic memory
Presentation type: Oral presentation / Talk
Session: Episodic Binding

Effects of a frontal brake light on pedestrians' eye-movements and reaction times in the perception of vehicle deceleration

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Over the last years, there has been a lively debate on whether (automated) vehicles should be equipped with novel external human-machine interfaces (eHMIs) in order to facilitate communication with nearby vulnerable road users. One simple approach is a frontal brake light (FBL), which indicates to road users in front of the vehicle that the vehicle is decelerating. It has been established that FBLs can facilitate the identification of decelerations and thereby efficiently communicate potentially important information about the vehicle's behavior. It seems plausible that exposure to FBLs alters eye-movements of observers trying to detect decelerations (e.g., visual attention is focused on the area where one expects an FBL to activate). As a possible consequence, the detection of decelerations in vehicles without an FBL may be impaired.
To investigate possible changes in eye movements caused by the presence of FBLs in traffic, an eye-tracking experiment was conducted. Twenty-nine participants were shown 138 videos of approaching vehicles from the perspective of a pedestrian standing at the curb. The vehicles either started decelerating (at three different distances from the participants) or maintained their speed. Over the course of the experiment, the quota of FBL-equipped vehicles in simulated traffic was increased (from 0% to 83%). The participants' task was to indicate the moment they perceived the deceleration.
First analyzes show large effects of the presence of an FBL on reaction times. Eye-movement behavior differed between the experimental conditions. More detailed results will be reported. Implications for the development of eHMIs will be discussed.
Keywords: human-robot interaction, traffic, pedestrian, communication, eye-tracking
Presentation type: Oral presentation / Talk
Session: Traffic Psychology II: Perceptual aspects

Measuring Non-Verbal Synchrony in Parent-Child-Interaction using Motion-Energy-Analysis and Standardized Play Situations

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Non-verbal synchrony (NVS) is the result of individuals aligning their non-verbal behavior during interaction. Previous research has shown a positive connection between NVS and positive aspects of human interaction and relationships. Motion-Energy-Analysis (MEA) is a method that automates and objectively evaluates NVS in situ by detecting changes in body movements from video recordings and representing them as frame-by-frame time series data. While there has been promising research on NVS using MEA in adult populations, such as couples or therapy sessions, research on parent-child-interaction (PCI) is scarce. However, given that the quality of PCI is vital for child development, examining PCI is a highly relevant topic, especially in children with a mental health condition, as they often encounter challenging and dysfunctional social interactions in their everyday lives. To close this research gap, we developed a novel lab-based social interaction paradigm comprising standardized play situations in combination with MEA to investigate NVS in authentic PCI situations. In a first pilot study, our results confirmed the feasibility of our novel paradigm and the suitability of MEA for the study of PCI. Building on this foundation, we initiated data collection in a clinical sample of parent-child-dyads (currently in treatment at our psychotherapeutic outpatient clinic) to investigate NVS between parents and their children in three different play situations. Additionally, we employ questionnaires to gather self-report information on experienced emotions, interaction quality, and relationship factors known to be linked with or affecting NVS, as well as game-related aspects to further validate our novel experimental approach.

Keywords: Non-Verbal Synchrony, Parent-Child-Interaction, Motion-Energy-Analysis, Play, Mental Health
Presentation type: No-Data Poster
Session: Interaction and Social Psychology

Does the way language knowledge accumulates over time change with age?

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Both young children and adults are excellent word learners. Behavioral studies indicate that there are differences in how the two groups accomplish this task, suggesting that the mechanism in which words are learned changes with age. One component of word learning is the associative linking of a label to an object. In the current adaptive artificial language learning paradigm, we examined this process. Participants between the ages of 8 and 25 years learned the association between multi-featured geometric figures (e.g., a red square that bounces) and multi-syllable pseudowords (e.g., MO-DA-SI). Each syllable of the pseudoword is determined by one specific feature of the shape (i.e., MO = color, DA = shape, SI = manner of motion). A previous version of this task for adults was designed to measure knowledge accumulation by fitting a state-space model on a trial-by-trial basis (Berkers et al., 2018). With the current version of the task, modified to be suitable for both children and adults, we ask (1) if the process of language knowledge accumulation changes as a function of age, and (2) if this measure of language knowledge accumulation can be related to an individual's vocabulary. We expect that age plays a role in language knowledge accumulation and furthermore predict that this measure is related to vocabulary. The results from this study will provide new answers to the question of how the word learning mechanism changes with age.

Keywords:
Presentation type: Oral presentation / Talk
Session: The Impact of Language Experience on Learning and Memory

Effects of Stimulus Order on Discrimination Performance Challenge Established Models of Psychophysical Judgement

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The ability to discriminate between physical magnitudes (e.g., loudness, brightness, duration) is a basic component of human judgment. Since the time of G.T. Fechner, discrimination performance has often been studied with the 2-Alternative-Forced-Choice (2AFC) paradigm, wherein which participants repeatedly compare a constant standard stimulus against a variable comparison stimulus. For the case of duration discrimination, it has been shown repeatedly that discrimination performance is better when the standard precedes rather than follows the comparison, a phenomenon which is referred to as the Type-B-Effect (TBE). This effect is not only counterintuitive but also contradicts standard psychophysical models such as Signal Detection Theory. Here, we present the results of a meta-analytic random-effects model designed to assess the TBE's generality and size. This meta-analytic regression model indicated real evidential value for the TBE and thus reveals it as a ubiquitous feature of the classic 2AFC task. Accordingly, future models of stimulus discrimination should ideally account for this effect. Although the mechanisms responsible for the occurrence of the TBE are currently not fully understood, memory updating, internal reference formation, and differential weighting of the two stimulus positions are plausible candidate mechanisms that are in line with our findings.

Keywords: Psychophysics, Stimulus Discrimination, Magnitude Judgment, Meta-Analysis, Order Effects
Presentation type: Poster Presentation
Session: Methods

The effect of opportunity costs on cognitive effort

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While trying to complete arduous tasks (e.g., emails, grading) our attention is often mired by the desire to disengage. Opportunity cost theories of mental effort argue that rather than this 'sense of effort' being a cognitive limitation, it is an adaptive signal which repels us from unrewarding tasks towards worthwhile alternatives; in short, this signal ensures our cognitive resources are not spent on fruitless pursuits. The current work tests the primary predictions of the opportunity cost theory of effort: that our phenomenology during a cognitively demanding task (sense of effort and boredom), and subsequent on-task behaviour (response times and accuracy), is affected by the value of the available alternatives. Over three experiments, manipulating both the extrinsic value (i.e., monetary reward) and intrinsic value of alternative tasks (i.e., how enjoyable the task is) we find little evidence in line with the predictions of the opportunity cost account. In Experiment 1 we observe no effect of the extrinsic value of an alternative task on participants subjective ratings or on-task behaviour during a primary task. Furthermore, in Experiments 2 and 3, while participants' subjective ratings of a primary task (e.g., sense of effort and boredom) are affected by the intrinsic value of an alternative, we observe no commensurate changes in participants' accuracy or response times.

Keywords: cognitive effort, opportunity costs, mental effort, cognitive control, cognition.
Presentation type: Oral presentation / Talk
Session: Cognitive Effort

The testing effect occurs with both simple and complex text material: A direct replication of the critical conditions of de Jonge and colleagues' (2015) experiments

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Many experiments have shown that the retrieval of already learning material helps to consolidate memory. Recent research, however, revealed the complexity of the text-material as a boundary condition for this effect. One of few experiments in favor of this assumption was published by de Jonge and colleagues (2015, EPR). In a series of two experiments, they showed that the benefit of testing compared to restudying occurred only for a "less complex" (incoherent, sentences in a scrambled order) but not for a "complex" (coherent, sentences in an inferential order) version of a science text about black holes. The dependent variable was measured by a cloze test. We present a direct replication of their original studies' critical conditions, differing in terms of statistical power and with respect to methodological design aspects: 2 Experiments varying final test delay and learning strategy in de Jonge et al.'s study; 1 Experiment varying learning strategy and text complexity here. In contrast to the original study, we found a main effect of retrieval practice increasing the long-term memory performance (one-week delay) independent from the text-material complexity.

Reference:
de Jonge, M., Tabbers, H. K., & Rikers, R. M. (2015). The effect of testing on the retention of coherent and incoherent text material. *Educational Psychology Review*, *27*, 305–315. https://doi.org/110.1007/s10648-015-9300-z

Keywords: testing effect; retrieval practice; text complexity; direct replication
Presentation type: Oral presentation / Talk
Session: Test-enhanced learning

Is my kitchen your kitchen? Do shared internal models lead to shared scene perception?

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During natural vision, the brain must infer real-world properties from sparse and noisy sensory signals. Predictive processing accounts suggest that this is enabled by comparing incoming information to predictions based on internal models. Given that internal models are critical for perception, can inter-individual variations in internal models explain why people diverge in their perception of the world?

In this study, an inter-subject representational similarity analysis framework will be employed to test whether idiosyncrasies in objective and subjective scene perception can be predicted by similarities in internal models of the world. To characterize internal models, we will ask participants to draw prototypical versions of indoor scenes. Additionally, participants will copy scene photographs (to control for drawing ability) and provide pictures of their homes (to control for immediate visual experience). For all three conditions, we will construct inter-subject representational dissimilarity matrices (RDMs) that capture the similarity of drawings across all pairs of participants. Subsequently, these RDMs will be compared to RDMs capturing inter-subject similarity in a set of behavioral performance metrics: (i) a categorization task involving photographs of indoor scenes and (ii) five subjective ratings on the same photographs (typicality, familiarity, attractiveness, usability, and complexity).

We hypothesize that inter-subject similarities in internal models predict inter-subject variations in perception. Consequently, behavioral RDMs should correlate most strongly with the RDM constructed from typical drawings, compared to RDMs constructed on the copied drawings or scene photographs. These findings would suggest that participants with similar internal models perceive the world in similar idiosyncratic ways.

Keywords: Scene perception, Predictive Processing, Mental representation, Individual differences, Phenomenology, Drawing, Representational similarity analysis (RSA)

Presentation type: No-Data Poster

Session: Perception I

Depth-of-processing effects for self- and other-reference show little success in capturing social self-construal: Evidence from free recall and recognition memory

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Memory for self-referentially (SR) encoded information is generally stronger than for other-referentially (OR) processed information. This self-reference effect (SRE) appears to co-vary with social distance, corresponding to a similar benefit for close over distant other-reference (CORE). SR/OR effects on memory are widely thought to selectively depend on a person's self-concept, including the degree to which it incorporates relationships with other people. We investigated the relationship of SR/OR effects with interdependent self-construal and altruism in two depth-of-processing experiments. Participants judged the descriptiveness of trait words for either themselves, a close relation, or a distant acquaintance before completing a memory test and questionnaire measures on interdependent/independent self-construal and past altruistic behaviour. Our results did not show any significant correlation between social self-views and SR/OR effects in free recall (N=142). Considering the comparatively larger SREs in recognition memory and episodic recollection, and free recall's presumable psychometric shortcomings, we again tested for associations of these traits with SR/OR effects on recognition performance and recollection estimates (N=161). Despite confirming all expected effects of reference condition on memory, we only observed a reduced advantage of SR over close other-reference with higher interdependence, which also showed an unexpected similar relationship with altruism. Correlations were observed in recollection estimates only, with recognition performance closely resembling the pattern of the null findings in free recall. While these results might reflect substantive issues regarding the questionnaires' target constructs and their link with schematic self-representation, they also highlight difficulties in applying performance-based experimental paradigms to the study of individual differences.

Keywords: memory, self, social cognition, individual differences, measurement, episodic memory
Presentation type: Poster Presentation
Session: Memory and Learning III

Diminished state space theory of human aging

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Many new technologies, such as smartphones, computers, or public-access systems (like ticket-vending machines), are a challenge for older adults. In the diminished state space theory of human aging, I suggest that these difficulties emerge from an underlying deficit in the representation of state spaces of cognitive tasks. In the first part of the talk, I will explain what I mean with state spaces and will present some of the empirical findings on age-related changes in learning and decision-making that led to the state space hypothesis. This will be followed by a description of the computational and neurobiological predictions that can be derived from the theory. I will conclude with some ideas for a generalization of the state space hypothesis to other cognitive domains and with a speculation on how age-related deficits in state space representations might be reflected in age differences in neural manifolds.
Keywords: Aging, cognition, theory
Presentation type: Oral presentation / Talk
Session: Advances in Developmental Cognitive Neuroscience

How do Distributive Biases affect Trust, Fairness Perception, Acceptance, and Adoption in Human versus AI-based Decision-Making?

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Artificial intelligence (AI) is increasingly emerging as a decision-making entity in our daily lives. Yet, individual responses to human (HDM) as compared to AI-based, algorithmic decision-making (ADM) are still poorly understood and prior findings are inconsistent. This highlights the importance of more comparative assessments of ADM and HDM prior to the implementation of corresponding AI-based decision-making processes. Here, we plan on expanding the Stimulus-Organism-Response framework to ADM versus HDM in the context of loan applications. We will manipulate whether a human agent or an AI supposedly decides on participants' (hypothetical) loan applications and assess perceived fairness, acceptance, and adoption of the corresponding decision-making system. Moreover, we will manipulate distributive fairness on an individual (positive vs. negative personal outcomes; Exp. 1) and group level (biased vs. unbiased overall distribution; Exp. 2). Prior research suggests that outcome favourability crucially impacts individual perception of decision-making processes irrespective of the decision-making mode. We expect that an HDM-mode as compared to an ADM-mode will lead to higher acceptance and adoption rates. Furthermore, we expect this effect to be impacted by participants' trust and distributive fairness perception. Our research aims to comparatively assess the mechanisms behind the perception and subsequent acceptance and adoption of ADM as compared to HDM systems.
Keywords: Decision-Making, AI, Distributive Bias, Fairness, Trust, Acceptance
Presentation type: No-Data Poster
Session: Decision Making

Age-related differences in selective listening: The interplay between attentional and sensory factors

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This study focuses on the relative contributions of attentional and sensory deficits in determining age-related impairments in selective listening. Young and older adults were tested in two consecutive sessions through a task-switching variant of dichotic listening and psychoacoustic methods, including pure tone audiometry and minimum audible angle. These methods were used to assess hearing thresholds in the frequency and the spatial domains. During each session, we determined participants' ability to intentionally switch auditory selective attention in space. In each trial, two different number words were simultaneously presented from two sound sources. Guided by visual cues, participants categorized the magnitude of the target stimulus at the to-be-attended location, while ignoring the distractor stimulus at the competing location. The results showed comparable reaction times and error rates between the two age groups, with similar practice-related benefits across sessions. In both groups, responses were slower and more error-prone with the target stimulus location switching between sequential trials (i.e., switch cost) and when the target-distractor pair elicited opposite responses compared to congruent responses (i.e., congruency effect). However, the congruency effect in error rates was greater in older adults than in young adults. The observed performance differences may be due to a reduced ability to selectively allocate auditory attention in space. Here, we discuss how age-related sensory deficits may account for at least part of the behavioral effects in this selective listening task. Addressing both attentional and sensory factors may contribute to more effective and targeted interventions to mitigate age-related impairments in auditory selective processing.

Keywords: Cognitive aging, Auditory attention, Hearing deficits, Attention switching
Presentation type: Oral presentation / Talk
Session: Cognitive Development across the Lifespan

Human and AI-based Topic Allocation in University Courses do not Differ in Perceived Justice, Trust, and Emotional Responses

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Artificial intelligence (AI) is increasingly taking over decision-making processes in our daily lives. First studies have revealed differences in the perception and evaluation of algorithmic decision-making (ADM) versus human decision-making (HDM) in select contexts. This highlights the importance of comparative assessments of ADM and HDM in the corresponding context prior to the implementation of corresponding AI-based decision-making processes. Here, we investigated the influence of the decision-making mode on justice perception, trust, and emotional responses (satisfaction and outrage) in students who were allocated their university course topics for presentations and projects based on ADM or HDM. Importantly, all topics were allocated according to the sample principles, but lecturers in the HDM condition pretended to decide themselves based on the information of a corresponding preference assessment system, whereas lecturers in the ADM condition explicitly stated that the AI decided. Furthermore, we varied whether the corresponding decision-making process was explicitly communicated as fair or whether no comment was made on the process' fairness. Against our expectations, Bayesian evidence indicated that whether a human or an AI allocated course topics had no impact on the perceived justice, trust, or emotional responses regarding topic allocation. Conversely, outcome favourability strongly determined students' evaluations of the allocation process. Although the preregistered stopping rule for data collection has not yet been fulfilled for all effects, the data thus far imply that students perceive ADM the same as HDM. Given that outcome favourability is central, ADMs that can optimize outcomes better than humans might therefore be preferable.

Keywords: decision making, AI, fairness, Justice, Trust, Emotions
Presentation type: Poster Presentation
Session: Decision Making

Do we learn to adapt? Daily-based force adaptation in infants, children and adults

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Humans are kinematic artists who adapt their movements flexibly to rapidly changing task conditions when experiencing mismatches between motor planning and actual task outcomes. Already in the first year of life, infants anticipate the weight, shape and size of objects in order to grasp them as efficiently as possible. However, little is known about the development of motor adaptation. In this study, we tested force adaptation in 1.5-year-old infants, 3-year-old children and young adults. Participants opened a drawer whose resistance was temporarily perturbed. In $group_{LHL}$, participants experienced a low (trials 1-12) to high (trials 13-24) to low (trials 25-36) drawer resistance; and in $group_{HLH}$, the sequence was reversed. The main dependent variable was the drawer opening peak speed. As expected, the change of drawer resistance decreased the drawer peak speed in the first adaptation trial (i.e., trial 13) of $group_{LHL}$ and increased it in $group_{HLH}$. In the subsequent adaptation trials (i.e., trial 14-24) all age cohorts of $group_{LHL}$ returned to their baseline drawer peak speed, while in $group_{HLH}$ their peak speed remained above their initial baseline. Thus, only $group_{LHL}$ revealed force adaptation. Although motor performance differed across age cohorts with infants and children having a higher movement variability and lower efficiency of the drawer velocity profile, no age effect on adaptation performance was found. Overall, it appears that even 1.5-year-old infants form internal models of force parameters and show adaptive performance when task requirements are unexpectedly changed.

Keywords: motor adaptation, internal model, development, motor skills
Presentation type: Oral presentation / Talk
Session: Motor Development and Cognition

Naturally arising strategies in the Flood Defence social dilemma

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Social dilemma games that treat cooperation and defection as a dichotomous behavior tend to oversimplify the potential complexity of human decision-making and natural strategies in such situations. Tit-for-tat is proven to be one of the most effective strategies in the Prisoner's Dilemma, but it quickly breaks when we start treating the level of cooperation as a continuous dimension. Social dilemmas also tend to focus on either a conflict of interest between the individual and the group, or between two groups, but rarely integrate the two. We propose a new social dilemma, called Flood Defence, where participants must distribute resources between their own group and an outside group with the option to keep resources for themselves. In our study, we aim to investigate the natural strategies people opt for in a dynamically changing social environment. Outside of one real participant, the rest of the players follow predetermined strategies, cycling through all the potential combinations of in-group and out-group favoritism-driven resource allocations (involving selfish strategies will be part of future research). Data from a nine-round game will be analyzed to identify the most prevalent naturally arising strategies, which then will be examined with questionnaire data along the factors of the Big Five, Dark Triad, and BIS/BAS scales to determine if these traits have an influence on our strategies in an inter-group social dilemma situation.
Keywords: Cooperation, Dark Triad, Big Five, Social Dilemma
Presentation type: No-Data Poster
Session: Decision Making

When the world tilts sideways: The influence of body position on the visual and auditory Simon Effect

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The impact of body position on spatial cognitive tasks seems to exist primarily when the task-relevant feature is non-spatial. In previous experiments modulating body position with a human gyroscope, we employed two types of spatial compatibility tasks: the spatial stimulus proper task in which participants are instructed to react to the location of a stimulus and the Simon task in which participants are instructed to react to a non-spatial feature of the stimulus, e.g. the colour. If the locations of the stimulus and response overlap (compatible trials), participants react faster and more accurate than if the locations are on opposites sides and do not overlap (incompatible trials), even if the spatial information is task-irrelevant as it is the case for the Simon task. While compatibility effects can be found in both tasks, body position modulated only the Simon effect. Here, we present the results of both visual and auditory Simon tasks, performed in an upright and horizontally tilted position. The focus will be if a modulation of the Simon Effect can be found independent of modality.
Keywords: Body position, spatial compatibility, Simon Effect, auditory, visual
Presentation type: Oral presentation / Talk
Session: Simon and his friends: New insights into the processing of task-irrelevant information

Intentional Forgetting Prevents Proactive Interference, but does not Improve Memory for Novel Stimuli

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When observers memorize different layouts of similar stimuli, their memory performance declines across trials. However, note-taking during the first trials prevents such a decline also in an unaided final trial. This effect was attributed to intentional forgetting of the preceiding stimuli (Eskritt & Ma, 2014; *Memory & Cognition*, 42, 237-246). We argue that the beneficial effect of note-taking on memory performance in the final trial emerges either from a release from proactive interference between subsequent materials or a release of mental fatigue. In two experiments, we aimed at disentangling these two explanations using a Concentration Game paradigm. In the first experiment (N = 53), we replicated the effect that internal memory performance was more accurate in a final (unaided) round of the concentration game (repeating the same pairs of cards) when the participants were allowed to take notes during the first rounds than when they had the solve the game without note-taking. In Experiment 2 (N=87), we varied whether the pairs of cards were repeated or novel stimuli. We observed that the beneficial effect of note-taking occured only for repeated pairs of cards, but not for novel pairs of cards. This finding suggests that note-taking released observers from proactive interference, but does not improve subsequent memory in a broader sense.

Keywords: cognitive offloading, intentional forgetting, concentration game, memory, saving-enhanced memory
Presentation type: Poster Presentation
Session: Memory and Learning III

Is automatic imitation modulated by similarity between model and imitator? An online study with realistic multiframe stimuli.

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Automatic imitation, demonstrated frequently with simple finger movements, refers to the tendency of individuals to involuntarily imitate observed task-irrelevant movement of others. In a meta-analysis (Cracco et al., 2018) it was revealed that automatic imitation, contingent upon the similarity between the model and imitator, lacks unequivocal findings concerning top-down modulation of similarity. In this online study, we manipulated top-down beliefs in a between-subject design, comparing human to robot imitation using novel multiframe stimuli in a third-person perspective. We predicted an increased imitative compatibility effect for the human than for the robotic hand, but no significant difference between these two agents in spatial compatibility. Our results (N=202) showed significant overall, spatial, and imitative compatibility effects for both, human and robotic hand stimuli. We found no significant difference in automatic imitation between the robot and human conditions neither in terms of reaction times, nor in error rates. Additionally, we found no significant difference between human and robotic hand stimuli in terms of perceived similarity and intentionality ratings, and no correlation with imitative and spatial compatibility effects. However, exploratory analysis showed that mood seems to correlate negatively with spatial compatibility. While online studies appear suitable for investigating automatic imitation per se, our results suggest that potential top-down modulation effects were not detectable in our online study.

Keywords: automatic imitation, similarity, top-down modulation, imitation
Presentation type: Poster Presentation
Session: Human Factors II

Studying risky choices: A comparative analysis of three perspectives

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How people make risky choices in life and what psychological and environmental factors affect these choices are key questions of the behavioral sciences. But little research has investigated the extent to which risky choices studied in behavioral research align with actual concerns of people's everyday lives, or with risky choices that lead to measurable life outcomes. This project aims to bridge the gap between these three perspectives. Two research questions guide our work: (1) How do these three perspectives differ in terms of the risky choices that they consider relevant? (2) What explains potential differences in terms of relevant psychological and environmental factors or domains? We collected extensive inventories of risky choices from all three perspectives through population surveys, an expert survey, and literature reviews, resulting in N = 214 risky choices. In a preregistered study, participants assess (1) the pairwise similarities of a random subset of these choices and (2) the importance of 30 theory-driven psychological and environmental factors when facing these choices. This allows us to identify shared and unique choices across these perspectives. We do this using participants' similarity ratings and by extracting choices' sentence embeddings to map the semantic space of these perspectives. Additionally, we use Bayesian mixed effects models and multidimensional scaling to explore perspective- and domain-specific profiles and conditional effects of psychological and environmental factors relevant to different risky choices. This research aims to refine the focus of risk studies and guide the selection of relevant (drivers of) risky choices for further study.

Keywords: risky choice, risk taking, data-driven inventory, comparative analyses
Presentation type: Poster Presentation
Session: Decision Making

The good, the bad, and the uglified: The effect of image quality on perceived scene beauty

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We are constantly surrounded by photographs: on social media, in advertisements, and many other aspects of life. Such images may be perceived as beautiful because of their very content (e.g., a spectacular rainbow) or their excellent quality (e.g., a well-executed photograph of an everyday object). However, many studies on visual aesthetics conflate these factors, making it difficult to determine to what extent the quality of an image influences its perceived beauty, and whether participants are able to judge an image's beauty independently of its quality. Focusing on scene perception, we algorithmically altered the image quality of a set of natural scene photographs. We created three versions of each image: images were 'beautified' by enhancing their saturation and upsampling them using a super-resolution deep neural network, 'uglified' by adding noise and reducing color fidelity, or left virtually unedited. Participants then rated these images in two behavioral studies. In the first study, participants rated each scene for its beauty. Here, uglified scenes were reliably rated as less beautiful than both beautified and unedited scenes. By contrast, beautification did not reliably increase beauty ratings for all images. In the second study, participants rated scene beauty and image quality at the same time. This dual task reduced the influence of image quality on beauty ratings, suggesting that participants can judge scene beauty and image quality relatively independently of each other. A simple concurrent judgment of image quality may thus be useful for experimentally disentangling beauty and image quality.

Keywords: neuroaesthetics, scene perception, image quality, visual beauty
Presentation type: Poster Presentation
Session: Perception II

Binding for graded errors

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Ample evidence points to binding between features of acted-upon stimuli and of correct responses, both in correct as well as erroneous action episodes. These bindings offer short-cuts in acting because encountering the same stimulus again retrieves the bound response, facilitating its execution. Whether these short-cuts are effective on the level of categorical decision-making or whether they also involve metric properties of overt body movements is an open question. We therefore assessed whether binding and retrieval emerges also for continuous movements that come with graded errors. Participants swiped their left or right index finger from respective starting positions to a small target circle on a tablet. The color of the circle instructed which finger to use in each trial. One of two irrelevant sounds accompanied the presentation of the circle and we expected that their identity would be bound to response features. Replicating previous finding, indications for binding and retrieval involving this irrelevant stimulus feature only emerged in temporal variables of planning and execution. However, we did not observe direct evidence for binding of these features and continuous response features. Instead, the results strongly suggest that continuous response features, i.e., both the correct position of the target circle and the final swiping position, are bound to their effector (left vs. right index finger). The current study therefore demonstrates binding and retrieval of goal-related and experienced aspects of the response that shape action control proper beyond decision-making.

Keywords: action control, binding and retrieval, error processing
Presentation type: Poster Presentation
Session: Cognitive Control and Conflict II

„Correct me if I am false" – does corrected „false" feedback reduce the asymmetry in memory between „true" and „false" feedback?

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In the research on memory for truth and falsity, an observed asymmetry often emerges: the truth of information is remembered better than the falsity of information (Ford & Nieznański, 2023; Nadarevic & Erdfelder, 2019). The mechanism underlying this asymmetry prompts inquiry. When encountering „true" feedback for information, we can easily incorporate it into our knowledge and simply make use of it. Conversely, „false" feedback for information is often less informative, so that less emphasis may be placed on its encoding. This begs the question: how can „false" feedback be made more informative and therefore worth remembering? One possible solution involves providing corrected information to false statements along with the "false" feedback (e.g. statement: *Muscat is the capital of Qatar*; feedback: *False - Muscat is the capital of Oman*). Johnson and Seifert (1994) found that corrected "false" feedback, compared to a simple denial, more effectively reduced the influence of misinformation on judgments. This suggests that corrected "false" feedback may enhance memory for a statement's falsity, thereby reducing the memory asymmetry between "true" and "false" feedback. To test this hypothesis, we plan to compare two conditions: original condition (statement + feedback) and corrected condition (statement + feedback along with the corrected version). We anticipate that in the original condition, the asymmetry in memory for "true" and false" feedback will replicate, whereas in the corrected condition the asymmetry will be reduced or fully eliminated. Furthermore, we hypothesize that memory for "false" feedback in the corrected condition will surpass that in the original condition.

Keywords: feedback memory, truth, falsity, recognition, MPT modeling
Presentation type: No-Data Poster
Session: Memory and Learning III

Fixations and pupil size as indicators of deceptive intentions

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Eyes have shown great potential to reveal cognitive processes as deceptive intentions. However, the complexity of comprehending the connection between eyes and deceptive behaviours is heightened by the eyes' susceptibility to numerous external and internal factors. This complexity occasionally results in contradictory findings in different studies. In this study, we investigated fixations and pupil motion as indicators of deceptive intentions in a card game design where participants had to choose a number on a card from 1 to 6 and were then presented with all the card possibilities. Two levels of deceptive intentions were tested - concealing or faking the chosen number - and compared to a control condition where participants had to be honest about this number. Two stimuli layouts were tested where the card possibilities were presented at the same time or one after another on a screen. Results showed that the concealing condition could be identified by more and shorter fixations when multiple cards were on screen, and by fewer and longer fixations when a single card was on screen. Fixations also revealed the cards participants wanted to communicate about in honest and faking conditions, while pupil size additionally unveiled the chosen card for both concealing and faking conditions. Interestingly, the two stimuli layouts induced opposite fixations behaviours for the same instruction. We suggest that at least two kinds of deceptive intentions should be carefully differentiated from eye movements while confirming the efficiency of gaze measures as indicators of deceptive intentions.

Keywords: eye tracking, intention, deception, faking, concealing, lying
Presentation type: Oral presentation / Talk
Session: Harnessing Gaze - Eyes for Information, Communication, and Understanding

Social Comparison and Effort Intensity in Unfixed Tasks: The Impact of Similar and Slightly Better Peers

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According to the Motivational Intensity Theory (MIT) (Brehm and Self, 1989), internal states such as needs and motives influence the maximum effort individuals are willing to invest in a task, determining potential motivation. Simultaneously, social comparison theory (Festinger, 1954) suggests that in a performance context, others serve as a source of information for assessing one's abilities, creating an upward pressure to outperform (Munkes & Diehl, 2003 ; Rijsman, 1974). While playing against similar or slightly superior peers intensifies this upward pressure, weaker peers or alone play should not impact it. In the present experiment, we examined the link between social comparison and effort-related cardiovascular response. Participants engaged in 2D video games of unfixed difficulty for 5 minutes, with displayed scores of similar, slightly better, or weaker peers. A control condition featured no peer score display. Measurements, including initial systolic time interval (ISTI), systolic and diastolic blood pressure, heart rate, and task performance, were recorded each minute. A 4 (social comparison) x 5 (time) repeated-measures ANOVA was conducted and yielded a significant social comparison x time interaction. A planned contrast on the final task minute revealed higher ISTI reactivity for similar and slightly better peers, compared to weaker and alone conditions. These findings demonstrate that effort is influenced by social comparison, with similar and slightly better peers increasing effort intensity. This is attributed to the upward pressure effect on potential motivation, subsequently determining high effort intensity in unfixed task demands, expanding on previous research on social information and effort.

Keywords: Motivation, Social Comparison, Effort
Presentation type: Oral presentation / Talk
Session: Cognitive Effort

Inhibitory processing involved in effective and efficient learning in children

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The human brain changes fundamentally over the course of life, however, whether such changes also impact on mechanisms of learning has remained uncertain. Here, visual perceptual learning, which refers to an enhancement of a visual skill through repeated experience or training, was used as a model to investigate whether mechanisms involved in the stabilization of learning during and after training differ between children (8 – 11 years old) and adults (18 – 35 years old). Participants (13 children, 14 adults) trained on a visual task that required them to detect the presence or absence of a visual orientation embedded in visual noise. Before, during and after the end of training, inhibitory (GABAergic) processing, which is associated with the stabilization of learning, was measured in early visual brain areas using functional magnetic resonance spectroscopy. The results showed that visual training triggered an increase of GABA only in children that persisted for several minutes after training ended. This finding predicted that training on new items rapidly increases the concentration of GABA in children and allows the learning to be rapidly stabilized. Subsequent behavioral experiments using new participants showed that children (n = 28) indeed stabilized new visual learning much more rapidly than adults (n = 28), which agrees with the common belief that children outperform adults in their learning abilities. Taken together, the results suggest that inhibitory, GABAergic processing during and after training is a key mechanism involved in effective and efficient learning in children.

Keywords: Children, Development, GABA, Inhibitory Processing, Interference, Learning, Training
Presentation type: Oral presentation / Talk
Session: Perceptual Learning

Assessing Ambivalence: The Potential of Eye-tracking Measures

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Ambivalence, the simultaneous experience of positive and negative thoughts and feelings regarding an attitude object, plays a crucial role in decision-making. Ambivalence has mostly been assessed through self-reports, reaction times, and also mouse-tracking measures. Recent research assumes that eye-tracking may provide further potential indicators for ambivalence, possibly overcoming some limitations of the currently established measures. However, this has not been validated yet. To do so, we implemented an eye-tracking study using an evaluation task frequently used in ambivalence research: Participants evaluated univalent, neutral, and ambivalent attitude objects as either positive or negative while their eye movements were recorded. After this, they evaluated the same stimuli with their mouse movements recorded, and finally, they rated the stimuli on different self-report measures of ambivalence. We expected that ambivalent stimuli elicit more fixation transitions and increase pupil dilation compared to neutral and univalent stimuli. Furthermore, these eye-tracking measures should correlate with the established measures of ambivalence. The results of a first preregistered study ($N = 84$) will be presented and their implications for assessing ambivalence in psychological research will be discussed.

Keywords: ambivalence, decision-making, attitude objects, eye-tracking, mouse-tracking
Presentation type: Oral presentation / Talk
Session: Decision Making II

Influence of social relevance on observationally acquired stimulus-response binding and retrieval in online interactions

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Previous studies showed that observationally acquired stimulus-response binding and retrieval (oSRBR) effects only occur when the observed person is socially relevant. This can, for example, result from task demands (e.g. cooperation, Giesen et al., 2014) or the relationship between the interacting people (Giesen et al., 2018). So far, most results showing modulations of oSRBR effects by social relevance were obtained from interactive face-to-face experiments. With the increased use of digital technology, this begs the question whether social relevance influences oSRBR effects in the same way in online interactions. To test this, we conducted two experiments. Both used an online interactive color classification task to assess oSRBR effects, but differed in how social relevance was manipulated: In Experiment 1 (N=154), we used a trust manipulation, inducing either trust or mistrust towards an observed interaction partner. Assuming that trust increases social relevance, we expected oSRBR effects to only be present if the observed person was trustworthy. In Experiment 2 (N=166), we manipulated social status between participants and an observed interaction partner. We expected that lower social status in participants should render higher status interaction partners more socially relevant, but not vice versa. Therefore, oSRBR effects should only occur for participants in the low social status condition, but should be absent in the high social status condition. However, in both experiments, robust oSRBR effects emerged in all conditions, showing no modulation by trust or social status. These results suggest online interactions might be less sensitive to social relevance manipulations than face-to-face interactions.

Keywords: stimulus-response binding, observational learning, online interactions, trust, social status
Presentation type: Oral presentation / Talk
Session: Feature binding in action control and beyond II: How binding contributes to stimulus-response learning, cognitive control, and event segmentation

The effects of climate change meta-knowledge on selective exposure, selective elaboration, and behavioral intentions

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People constantly need to select which information to attend to and how many cognitive resources to allocate for the processing of this information. This experiment ($N = 510$) examines how individuals' meta-knowledge (i.e., the self-perception of one's issue knowledge) influences this selective exposure to and selective elaboration of related information for the case of climate change. We therefore manipulate participants' meta-knowledge by providing fake feedback in a climate change knowledge test. Integrating literature from different disciplines, we derive competing hypotheses on how this relationship might look like with meta-knowledge either increasing or decreasing selective exposure (H1a, H1b) and selective elaboration (H2a, H2b). We further propose climate change self-schema as a possible mediating factor (H3) and investigate effects of meta-knowledge on related behaviors (H4). Our data did not support any direction of hypotheses 1 and 2 since we did not find significant group differences in neither selective exposure nor elaboration. However, (pre-registered) correlational analyses on the relationship between self-rated subjective knowledge and selective exposure and elaboration speak for a positive relationship, $r_{SelectiveExposure} = 0.17$, $p < .001$, $r_{SelectiveElaboration} = 0.33$, $p < .001$. This could be explained through climate change self-schemas which differed significantly between the two conditions ($t(507.47) = 2.92$, $p = .004$, $d = 0.26$) and correlated positively with selective exposure ($r = 0.36$, $p < .001$) and elaboration ($r = 0.28$, $p < .001$). These results give new insights into how people might actively manage their cognitive resources through metacognitive monitoring.

Keywords: metacognition, climate change, selective exposure, selective elaboration, self-schema
Presentation type: Poster Presentation
Session: Human Factors I

Synthesizing text comprehension and multimedia learning research: Text-picture combinations are activated, integrated and validated automatically

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In two experiments, we investigated whether automatic activation, integration, and validation processes apply to sequentially presented text-picture combinations. In previous experiments, we already showed that simultaneously presented text-picture combinations are automatically integrated and validated. In these experiments, we used an adapted version of the Epistemic Stroop paradigm (Richter et al., 2009): Participants saw either valid (text and picture matched) or invalid text-picture combinations (text and picture mismatched). These stimuli were followed by the probe words "right" or "wrong" to which participants reacted with different key presses. Even though participants were instructed to react independently of the stimuli to the probe words, participants showed a Stroop effect: they answered slower and made more errors in incongruent trials (validity of the stimuli and the probe words mismatched) as in congruent trials (validity of the stimuli and the probe word matched). In the current experiments, we extended these findings by presenting the text-picture combinations sequentially, that is, an unrelated task was presented between the text and the picture part of each stimulus. We found a Stroop effect in Experiment 1 (N = 251), which used one-sentence picture combinations, and in Experiment 2 (N = 266), which used multiple-sentence picture combinations. This suggests that participants not just automatically integrate and validate text-picture information but that they also automatically activate text or picture information which is no longer available in working memory. These findings have implications for text comprehension and multimedia learning theories.

Keywords: RI-Val Model, Epistemic Stroop, Multimedia Learning
Presentation type: Oral presentation / Talk
Session: Language

The Role of Representing Action-Relations in Joint Action Planning

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During joint actions, people may not only represent individual actions required to achieve a joint outcome but also relations between individual actions. For example, they may represent whether individual contributions to a joint action from different co-actors are the same or different. We conducted two cueing experiments to address this question.
In experiment 1 (N = 24), pairs of participants performed a joint computer task that required flipping blocks to produce a joint pattern. Two types of cues were presented in sequential order before the task was fully specified: A joint cue specified the relationship between individual contributions (same or different block rotation) or provided no information. This was followed by an individual cue that specified one's own task, the partner's task or was non-informative. Response times were faster when joint cues specified the relationship between individual contributions, especially when individual cues specified the partner's action.
Experiment 2 (N = 24) investigated whether relational information about individual action contributions need to be specified prior to information about specific individual contributions or whether relational information can be effective even when the partner's action is already specified. We found that the joint cue is effective regardless of whether it precedes or follows cues that specify individual action contributions.
Overall, these results provide evidence that successful joint action does not solely rely on representations that specify individual contributions. Information regarding the joint configuration helps integrate representations of individual contributions to a full representation of the joint action and facilitates specifying one's own contribution.

Keywords: Action planning, Joint action, Social cognition
Presentation type: Oral presentation / Talk
Session: Joint Action

Load-dependent cognitive control in working memory and social cognition

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For a long time, the concept of cognitive coordination and control has not been applied to social cognition and mentalizing. Mainly because mentalizing tasks were rather easy and not performed with varying task difficulty (i.e., cognitive load). However, we could show in an EEG study that the coordination of briefly maintained information (i.e., working memory) during cognitively demanding social tasks was implemented with the same phase-amplitude coupling mechanism as shown for visual working memory tasks: Depending on the effort necessary for cognitive operations, the phase of slow frontal oscillations was used to precisely tune communication with posterior brain areas in both, social and visual working memory tasks. Thus, our findings revealed a phase-amplitude coupling mechanism to be responsible for successful social and visual working memory by tuning the fronto-parietal network depending on load. This was true for participants having low autistic personality traits. However, participants with high autistic personality traits struggled with efficient tuning of fronto-parietal networks. We suggest that this coupling mechanism can explain how communication between distant brain areas is effectively controlling cognitive functions and might even explain cognitive and social deficits in mental disorders.

Keywords: EEG, working memory, social cognition, cognitive control and coordination, phase-amplitude coupling, autistic personality traits
Presentation type: Oral presentation / Talk
Session: Rationalizing on the Constraints and Structure of Cognitive Control – Lessons from Laboratory and Field Assessments

Integrating the Speed Prior Account and Predictive Processing: Bayesian Brain from Theory to Experiment

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This presentation integrates two theories of visual perception operating on different levels of generality: the speed prior account and predictive processing. The speed prior account is able to account for many disparate motion perception illusions, arguing that perception arises from an aggregation of a prior expectation of a certain motion speed with visual data to arrive at a posterior 'perception'. For example, the representational momentum effect (an illusion where a moving object is remembered further along in the direction of motion) arises when the expected speed (prior) of a moving object is faster than the actual speed (data), which gives rise to the percept (posterior) that the object was further ahead. While this theory focuses solely on motion perception, another bayes-inspired account is more general. Under predictive processing, perception (and cognition and action) functions by constructing continuously-updated models of the world (posteriors) from which to derive predictions (priors) that filter incoming signals (data). This theory presentation argues that the speed prior account can be viewed as an experimentally-driven, concrete implementation of the more general "grand unifying theory" predictive processing. By integrating the two, it 1) extends the reach of predictive processing into a more specific, falsifiable domain, while 2) the speed prior account is joined to a stronger theoretical framework from which to derive hypotheses. This combined framework operating on conceptual levels from general and abstract to specific and concrete would be a significant step forward in understanding one of the most important aspects of human perception.

Keywords: representational momentum, perception-action coupling, internal models, top-down processing
Presentation type: Poster Presentation
Session: Perception I

The relation between learning and stimulus-response binding

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Perception and action rely on integrating or binding different features of stimuli and responses. Such bindings are short-lived, but they can be retrieved for a limited amount of time if any of their features is re-activated. This is particularly true for stimulus-response bindings, allowing for flexible recycling of previous action plans. A relation to learning of stimulus-response associations suggests itself, and previous accounts have proposed binding as an initial step of forging associations in long-term memory. The evidence for this claim is surprisingly mixed, however. Here we propose a framework that explains previous failures to detect meaningful relations of binding and learning by highlighting the joint contribution of three variables: (1) decay, (2) the number of repetitions, and (3) the time elapsing between repetitions. Accounting for the interplay of these variables provides a promising blueprint for innovative experimental designs that bridge the gap between immediate bindings on the one hand and lasting associations in memory on the other hand.
Keywords: S-R binding; event-coding; learning; memory
Presentation type: Oral presentation / Talk
Session: Feature binding in action control and beyond I: How binding contributes to stimulus-response learning, cognitive control, and event segmentation

Performance-contingent reward increases the use of context information in a conflict task

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In the Simon task, participants respond to a relevant target dimension while ignoring spatial context information. Target and context information can be congruent or incongruent, resulting in a congruency effect. This effect is typically larger after congruent trials (congruency sequence effect, CSE), presumably because incongruent trials trigger increased focus on the target and inhibition of the distracting context information. In a previous experiment with a number Simon task, we found that specifically performance-contingent (but not non-contingent or no) reward increased the use of context information following congruent trials, while the adaptation to incongruence was the same in all conditions. Drift diffusion model (DDM) analyses revealed that this reward effect was captured by the drift rate parameter. Here, we present a follow-up study using a confound-minimized Simon task, again combined with performance-contingent, non-contingent, or no reward prospect. The CSE was generally increased in the reward phase compared to a non-reward baseline. Furthermore, performance-contingent reward specifically increased the congruency effect, and DDM analyses again found a corresponding effect on the drift rate. Taken together, these results suggest that performance-contingent reward prospect does not induce a simple speed-accuracy trade-off, but rather increases the use of context information, which is beneficial in congruent but detrimental in incongruent trials. Differences between the present and previous results suggest that the CSE is additionally influenced by feature repetitions.
Keywords: cognitive control, conflict, Simon, congruency sequence effect, drift diffusion model, reward, fast-dm
Presentation type: Oral presentation / Talk
Session: Affect, motivation and control I

Revisiting the orthographic prediction error in visual word recognition: Using computational modeling and deep learning to investigate visual processing in reading.

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Evidence suggests that readers optimize low-level visual information following the predictive coding principles. Based on a transparent neurocognitive model, we postulated that readers remove redundant visual signals to focus on the informative aspects of the percept (i.e., orthographic prediction error; oPE). Here, we test alternative oPEs by assuming all-or-nothing signaling units based on multiple thresholds (i.e., neuronal output modality). Further, we tested if readers signal predictions from one or multiple units. For model evaluation, we compared model fits of the new oPEs with each other and against the original formulation based on behavioral and electrophysiological data (EEG). We found the highest model fit for the oPE with a 50% threshold integrating multiple prediction units for behavior and the late EEG data (cluster: from 300-800 vs. 360-620 original oPE). The early EEG data was still explained best by the initial hypothesis (cluster: 210-250 ms vs. 150-250 ms original oPE). Also, we trained image recognition models (ResNet18) in a lexical decision task with the new oPE, the original oPE, or letter string images as input. The assumption is that representations should be better suited for learning if they are optimal. Again, the new oPE formulation performs best. Thus, this formulation adequately describes behavioral performance and allows optimal model training. Brain activations, however, showed that the new oPE was only better for describing the late but not the early activations. This pattern of effects might indicate an evolvement of more optimal representations from early to late brain processes.

Keywords: Visual word recognition, Visual-orthographic processing, Predictive coding, EEG, Computational modelling, Deep learning
Presentation type: Oral presentation / Talk
Session: Methods in reading and language research

Welcome to the island – eine Untersuchung zur bimodalen Informationsaufnahme

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Information processing (i.e., learning and retrieval) leads to better outcome for the visual (as compared to the auditory) modality as well as for the first acquired language (L1) as compared to L2. In our study we investigated whether this modality dominance also holds when information is presented simultaneously in two modalities (i.e., visual and auditory) using two languages (L1 and L2). To this end, we presented written and spoken information related to fictious islands in German and English. Information was the same in both modalities, only language of presentation in either modality was systematically manipulated for a later recognition test. In the data of 49 participants, we observed a main effect of congruency when languages matched across information presentation modality, but neither an influence of a specific modality-language mapping or a relationship of the congruency effect to objectively or subjectively assessed language competence. The data question the better acquaintance of visually presented information in L1 in mixed modality designs.

Keywords: modality, learning and retrieval, bilingualism
Presentation type: Poster Presentation
Session: Language

From allocentric motor-goal localisation to egocentric planning of movements – how spatial reference frames dynamically shift with cognitive demand

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Human and non-human primates interact with their environment by manipulating objects. This requires planning and executing reaches to transport the hand to object-relative positions on the objects. Previous studies showed that frontal and parietal lobe areas encode reach goals in coordinate systems anchored to different parts of the subjects' body, such as hand position or gaze direction. Such egocentric encoding is a well-known property of brain areas along the dorsal pathway, whereas allocentric encoding with a reference frame centered on an object, is not. Different to previous experiments, which typically only demanded egocentric spatial processing during movement preparation, we designed a task where monkeys memorized an on-the-object target position and then planned a reach to this position after the object re-occurred at variable location with potentially different size. We found allocentric (in addition to egocentric) encoding in the dorsal stream reach planning areas, parietal reach region and dorsal premotor cortex, which is invariant with respect to the position, and, remarkably, also the size of the object. This means that neurons in the same areas can encode object-centered allocentric spatial information, independent of object location and object size, or egocentric information, depending on dynamically changing cognitive demands. This dynamic adjustment suggests that the prevailing frame of reference is less a question of brain area or processing stream, but more of the cognitive demands. Such dynamic shift seems inconsistent with a functional segregation for ego- and allocentric encoding between processing streams.

Keywords: spatial cognition, goal-directed reaching, reference frame, motor planning, working memory
Presentation type: Oral presentation / Talk
Session: Egocentric and allocentric reference frames: Integrating across measures, task complexity, and spatial scales

How expectations influence scene gist recognition: A diffusion model analysis.

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When we perceive the world, visual input follows a meaningful structure, which can be considered as “grammar” of the visual scene, as the relationships between scenes have been learnt implicitly from the rules of the world like learning a language. For example, we expect to see scenes of the hallway – rather than a parking lot – when leaving an office. In the present study, we aim to disentangle the effect of expectations on the scene gist recognition process. In each trail of the experiment, participants will see a sequence of visual scenes, where the previous pictures serve as primes for the latter ones. The experimental design comprises two within-subject factors: Scene category change at superordinate level (i.e., a change from indoor to outdoor) and expectancy level for target scenes. In the high expectancy condition, the primes and target will be displayed in a spatial temporal coherent sequence, whereas in the low expectancy conditions, primes and the target will be shown in a randomized sequence. We hypothesize that high expectancy will facilitate gist extraction and thus speed up response times and accuracy of scene categorization. Further, we expect that the facilitation effects result from faster speed of evidence accumulation (i.e., drift rate) in high expectancy than low expectancy. Besides, we also test for an effect of scene category change on the starting point of the diffusion process. To test these hypotheses, we fit diffusion model with parameters depending on different conditions using a hierarchical Bayesian parameter estimation procedure.

Keywords: Gist recognition, Diffusion modeling, Priming, Natural scenes
Presentation type: No-Data Poster
Session: Perception I

Systematically Testing Differences in Replications of the Evaluative Conditioning Effect across Online and Lab-Settings

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In this project we test an evaluative conditioning effect (EC; a change in liking due to paired presentations) across a series of five replication studies. These studies represent different realizations of online- and lab-settings and include: (1) a lab experiment with an experimenter present (university sample), (2) a lab experiment without an experimenter (university sample), (3) an online experiment on computers (university sample), (4) an online experiment on a computer or laptop (provider sample), (5) an online experiment on a smartphone (provider sample). Adjacent studies are identical in all aspects (experimental program, incentives, language etc.) but one that is systematically varied. Statistical approaches are used to identify and deal with unintended, but unavoidable, difference such as biased drop-out or non-compliance.

This research is part of a larger project in which we aim to systematize possible causes for (non-) replication and develop design and analysis techniques to identify them within specific fields based on the Causal Replication Framework (CRF, Steiner, Wong, & Anglin, 2019) which systematizes study characteristics. Differences in results across replications (and other cross-study comparisons) are typically difficult to interpret because several factors vary at once. Even in EC, a relatively well-understood effect, unintended differences (for example in attention or personality traits) are theoretically plausible to affect the outcome.

We will report results from the five replication studies with a focus on how closely the EC effect is replicated. We highlight challenges in avoiding unintended study differences and offer strategies to deal with them.

Keywords: evaluative conditioning, conceptual replications, causal replication framework
Presentation type: Oral presentation / Talk
Session: Current Developments in Evaluative Conditioning: Methodologies, Mechanisms, and Manifestations

Unique Binding: Eliminating the effects of previous stimulus-response pairings on binding effects

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Action control theories propose that forming a new action plan involves integrating task-relevant percepts and motor programs into an event file, resulting in the binding of all components associated with a specific action episode. While repeating all elements of an event file in a subsequent action episode enhances execution speed and reduces errors, partial repetitions lead to performance detriments. Notably, the observed binding effects in action control tasks are typically short-lived, mainly attributed to event file decay. In multiple experiments, another important factor contributing to the transient nature of binding effects is explored: Interference - caused by alternating associations of a single stimulus with different responses or a single response with different stimuli over the course of the experiment. Previous studies could show that paradigms that mitigate interference by expanding the stimulus set can produce stronger and more enduring stimulus-response associations, even with a single pairing (e.g., in long-lag repetition priming). However, due to a limited response set, these paradigms do not prevent a single reaction being bound to different stimuli. In a series of experiments, we systematically explored the influence of multiple bindings of a single distractor or response on overall binding effects. To this end, we manipulated whether distractors and/or responses could occur in several trials during an experiment or only in a single trial.

Keywords: action control, binding
Presentation type: Oral presentation / Talk
Session: Episodic Binding

Personal task choice can shield against implicit affective influences on effort

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Two experiments (N = 256 university students) tested whether personal task choice can attenuate previously found implicit affective influences on cardiac responses reflecting mental effort. Based on a recent action shielding model (Gendolla et al., 2001), participants could ostensibly either personally chose characteristics of an upcoming cognitive task or not. In Experiment 1, replicating previous research, priming anger resulted in stronger PEP responses than priming sadness in an assigned objectively difficult memory task. Most relevant, this replicated affect prime effect disappeared when the task could ostensibly be personally chosen. In Experiment 2, priming sadness resulted in stronger PEP responses than priming happiness. Also this affect prime effect disappeared when participants could ostensibly choose their task, resulting in strong PEP responses reflecting high effort in both affect prime conditions. This pattern suggests that participants tried to do their best in the memory task and provides the first evidence for choice induced shielding against the effects of positive affect on effort intensity. Taken together, the present experiments' findings match with other recent evidence showing that personal action choice shields against incidental affective influences on action execution and especially on effort-related cardiovascular response (e.g., Bouzidi & Gendolla, 2023; Falk et al., 2022a, 2022b).

Keywords: effort, affect, implicit, volition, psychophysiology, choice
Presentation type: Oral presentation / Talk
Session: The intensity of mental effort: Hot news from the body

Expertise modulates walking and gaze behavior in virtual artwork exploration

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Virtual reality enables the investigation of human behavior in naturalistic environments while maintaining high experimental control. This facilitates the evaluation of human behavior and interaction with objects in more naturalistic settings. For instance, people's engagement with artwork has been found to last almost 10 times longer in museums compared to lab environments. Additionally, walking behavior in virtual museums closely matches walking in an actual museum. Building upon prior studies that examined the behavior of museum visitors in immersive virtual environments, our study investigated how structural aspects of Greek statues affect walking and gaze behavior in archeology experts and non-experts. Participants performed a task in virtual reality wearing a head-mounted display (HMD). They were asked to explore different statues that carried their diagnostic information mainly on the front (single-perspective) or on multiple sides (multi-perspective). We tracked participants' head and gaze position via the HMD. Experts and non-experts differed in their walking and gaze behavior, especially when exploring multi-perspective statues. Experts spent more time overall exploring the statues and looked longer at the sides than the front of multi-perspective statues compared to non-experts. These results enhance our understanding of how humans freely interact with complex objects in naturalistic environments and how expertise changes the way we look at things.

Keywords: object exploration, eye tracking, museum, ecological perception, virtual reality
Presentation type: Oral presentation / Talk
Session: Natural Scene Perception

Age-effects on eye and hand movement when intercepting moving targets

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Catching a rolling egg before it falls off the table requires precise, synchronized hand and eye movements when anticipating the egg's path. However, both hand and eye movements are subject to sensorimotor delays, as they are based in part on sensory information obtained in the past. These sensorimotor delays may increase with age, reducing older adults` sensory sampling and requiring them to adjust their sensorimotor behavior accordingly. We examined how aging affects hand and eye movements when intercepting a moving object at a specific target area on screen. In a first experiment, younger and older healthy adults were required to intercept an unpredictable moving object with the exact target area being either of low (i.e., a disc) or high (i.e., a curved bar) spatial uncertainty. Hand and eye movements were moved generally later when the target area was of low spatial uncertainty. However, for both target areas, older adults shifted their hand and eye toward the target area systematically earlier than younger adults. In a second experiment, the object followed a straight and predictable path with the target areas remained identical. As expected, both groups moved their hand and eye toward the more predictable target areas prior to the first experiment. Again, older adults initiated these movements earlier than younger adults. In summary, eye movements are shifted toward the target location earlier when continuous visual sampling is less important. We associate aging with stronger proactive hand and eye movements, which may compensate for sensorimotor delays in manual actions.

Keywords: aging, eye-hand-coordination, prediction, uncertainty
Presentation type: Oral presentation / Talk
Session: Cognitive Development across the Lifespan

Inter-individual perspectives on musical styles: exploring favorite music descriptions

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Our study explores the aesthetics of favorite music, particularly how individuals describe it. To achieve this, we collected self-generated adjectives in form of free descriptions from participants to uncover the distinctive qualities and characteristics associated with different favored musical styles.
N = 802 participants rated 15 musical styles and 3 to 11 substyles on a 7-point Likert scale. Additionally, they provided up to 20 adjectives that best describe their favorite music. We analyzed a total of n= 7,380 adjectives, categorizing them into 'semantic fields' by combining synonyms and closely related adjectives. We analyzed the adjectives' frequency of occurrence, the dimensions of musical value judgments, a cognitive salience index, and compared those measures between various musical styles.
Chosen descriptions for the favorite music can be independent or dependent of musical style. For example, our results highlight the term "touching" as a relevant description, prominently featured across various musical styles. In contrast, "hard" and "powerful" clearly characterize metal, while electronic music styles are defined by descriptions such as "energetic," "motivating," and "encouraging." The analysis of frequency of occurrence and the cognitive salience index unveiled emotional and stylistic commonalities as well as distinctions of the musical styles.
By employing a multifaceted approach to explore the aesthetics of favorite music, we are able to identify commonalities and differences in the aesthetics of various musical styles. These findings provide a compelling foundation for further research in music aesthetics, facilitating a deeper understanding of the complex experiences and evaluations individuals maintain with their favorite music.

Keywords: aesthetics of favorite music, descriptions, musical styles, adjectives
Presentation type: Oral presentation / Talk
Session: Experimental Aesthetics I

Using Eye Tracking to Investigate Trust in Human-Human and Human-Robot Partners

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Social robot teammates have entered the workforce in a variety of sectors including healthcare and the service industry. Understanding how trust in robot partners differ from human partners is imperative in ensuring effective and cohesive work environments. The calibration of trust can help to prevent the misuse (overreliance) or disuse (underutilization) of autonomous systems. To gain deeper insight into trust dynamics further research on objective physiological indicators, like eye tracking, is essential. This research aims to explore novel measures of trust in human-robot interaction, aligning perceptions with actual capabilities. Specifically, we will examine differences in trust when participants are paired with either a human or robot teammate, with varying capabilities, while completing a visual search task. We will use eye tracking to analyze gaze behavior and teammate monitoring, found to be a good physiological indicator of automation trust, and mouse clicks as behavioral indicators of trust. We hypothesize that monitoring (fixation points on the partner screen) and mouse clicks (assisting their partner) will increase for both human and robot teammates when their capabilities are low versus high, demonstrating that our objective measures are capturing varying levels of trust. Additionally, we hypothesize that robot partners will be monitored less than human partners because of an overreliance on mechanistic agents when completing analytical tasks. This study has the potential to identify a new objective measure of trust in human-robot interactions.

Keywords: Trust, Human-robot interaction, Eye tracking, Teams, Social robots, Measures
Presentation type: No-Data Poster
Session: Human Factors II

Wall-E versus Terminator – Exploring attributions of agency and experience to robots of varying appearance using explicit and implicit measures

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Although agency, the ability to plan and act, is often seen as the key feature of what it means to be human, it is experience, the ability to sense and feel, that accounts for most variance when ascribing mind to non-human entities. Specifically when it comes to robots, we readily ascribe agency but are not expecting a high level of experience from them. However, as we are heading into a direction where robots become increasingly integrated in social contexts of our lives, a closer evaluation of the experience dimension will become highly relevant when it comes to an ethical incorporation of robots that benefits society. In the present experiment, we explore how different combinations of physical features in robots shape the impression of capabilities related to either agency or experience. For this purpose, we present participants with words associated with agency (e.g., reason) or experience (e.g., love) and ask them on a trial-by-trial basis which of two robots that vary in terms of their physical features they more strongly associate with the presented term. We use mouse tracking to capture explicit judgments related to mind perception (i.e., which robot), as well as the level of uncertainty associated with these decisions via mouse movement curvatures, which we hope to use as an implicit measure for the strength of association between a mind perception related term and the physical appearance of a robot. 104 participants will be collected (based on a power analysis assuming a medium effect size).

Keywords: Mouse Tracking, Mind Perception, Implicit Attitude, Human-Robot Interaction
Presentation type: No-Data Poster
Session: Human Factors II

Does the perceived human-likeness of a robot partner modulate the Joint Simon Effect in an online setting?

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Joint action refers to the mechanism of co-representing others' actions when cooperating with them in a shared task, such as the Joint Simon Task. This task requires participants to respond to an assigned stimulus (e.g., diamond) and inhibit responding to another stimulus that is assigned to their partner (e.g., square). When the assigned stimulus is spatially compatible with the response, participants are faster than when stimulus and response are spatially incompatible. Crucially, this Joint Simon Effect (JSE) only occurs, when the task is completed together with a partner whose actions are being co-represented but not when participants perform the ask alone. The JSE is sensitive to various manipulations concerning the social relationship and the similarity between participant and partner, making it suitable for measuring constructs such as in-group favoritism but also an agent's perceived human-likeness. The goal of our experiment is to examine (i) whether the JSE can be reliably found in an online setting where the players and their responses are only represented via simulated key presses, and (ii) whether the perceived human-likeness and similarity-to-self of a robot partner modulates the JSE. There will be three conditions in the experiment (no partner vs. mechanistic robot vs. humanoid robot; manipulated between participants) and 120 participants will be collected (based on a power analysis assuming a medium effect size). We expect to find no JSE in the no partner condition, as well as a larger JSE in the humanoid versus mechanistic robot condition.

Keywords: Joint Simon Effect, Human-Robot-Interaction, Anthropomorphism, Joint Action, Cooperation
Presentation type: No-Data Poster
Session: Interaction and Social Psychology

Sense of Agency and Reinforcement Learning: Freedom of Choice Increases the Neurophysiological Impact of Affective Action Outcomes

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Freedom of choice (FoC) enhances the sense of agency over the outcomes of our actions and has been suggested to benefit experiential learning. Yet, how agency experience influences the neurophysiological processing of feedback during goal-directed behavior is not clearly understood. We performed two EEG studies to examine how FoC influences feedback processing during reinforcement learning. Participants received performance feedback in the form of monetary gains and losses following binary item choices determined by the self or the computer. Study 1 (N = 30) revealed augmented feedback-induced midfrontal theta power for free compared to forced choices, irrespective of feedback valence, suggesting enhanced performance monitoring for self-determined actions. Study 2 (N = 37) demonstrated that the choice-induced increased neural impact of affective feedback generalizes to the ERP domain. Free compared to forced choices elicited a larger N100, reflecting intensified sensory feedback processing. In addition, only self-determined action outcomes elicited a Reward Positivity, indicating a selective differentiation of positive and negative feedback for self-determined actions. Interestingly, study 2 also points towards a stronger impact of choice on midfrontal theta power for negative feedback. Crucially, our results suggest that the neuronal impact of affective feedback is specifically associated with FoC, rather than learning differences between free and forced choices. Intensified processing of affective feedback when being endowed with FoC might constitute a functional mechanism facilitating goal attainment when experiencing a high sense of agency. Further research is needed to disentangle whether positive feedback, negative feedback, or both predominantly mediate this relation.

Keywords: sense of agency, freedom of choice, reinforcement learning, feedback processing, EEG
Presentation type: Oral presentation / Talk
Session: Self-Processing in the Social Mind: Insights from Behavioral and Neurocognitive Psychology

Dissociating the roles of episodic retrieval and contingency awareness in valence contingency learning

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In the valence contingency learning task (VCT), participants evaluate target words which are preceded by nonwords. Nonwords are predictive for positive/negative evaluations. This produces (a) robust contingency learning effects, reflected in faster and more accurate performance for highly contingent nonword-valence pairings and (b) less robust evaluative conditioning (EC) effects, reflected in more positive ratings of nonwords that were highly predictive for positive (vs. negative) evaluative responses. In a highly powered (N=129) preregistered study, we investigated both effects and assessed whether they are a consequence of episodic retrieval of incidental stimulus-response (SR) episodes or contingency awareness. Participants were either explicitly instructed about contingencies (instructed learning group) or not (incidental learning group). Both groups then worked through the VCT, an explicit rating task, and a contingency awareness test. Both groups showed contingency learning effects and EC effects for nonwords. Hierarchical multi-level analyses showed that contingency learning effects were fully explained by episodic retrieval of SR episodes only in the incidental learning group, but not in the instructed learning group. EC effects in turn were fully explained by nonword-specific contingency awareness. Implications for theories on processes underlying contingency learning and evaluative conditioning are discussed.

Keywords: contingency learning, evaluative conditioning, stimulus-response episodes, episodic retrieval, contingency awareness
Presentation type: Oral presentation / Talk
Session: Episodic retrieval of recent stimulus-response episodes as a source of cognitive control and learning

The influence of stress on value-based decisions from memory

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Stressful events can have a pervasive influence on various memory processes, and many of our everyday decisions require us to retrieve relevant information from memory. How memory-based decision making is influenced by stress, however, remains unclear at this point.

In this preregistered study, participants were asked to make value-based decisions that required the retrieval of options (food snacks) from memory. After encoding the association of different snacks with different screen locations, a group of 78 participants were put under stress by holding their hand into ice water for three minutes, while the control group of 80 participants put their hand into lukewarm water. Afterwards, participants made memory-based decisions by retrieving the snacks via their associated locations on the screen as well as control decisions with visible snacks.

Hierarchical Bayesian statistical analyses revealed credible group differences in subjective ratings, blood pressure, and heart rate, thus confirming the successful manipulation of stress. As predicted, memory demands affected choice consistency and response times, and we successfully replicated a memory bias on value-based decisions. Surprisingly, the stress group made more consistent choices, with no other credible influences of stress on decision speed or memory accuracy. Modeling memory-based decisions with the Drift Diffusion Model (DDM) suggested a slightly increased drift rate and boundary separation for the stress compared to the control group.

Our work suggests that stress might have a negligible effect on simple value-based decisions from memory.

Keywords: stress, preferential choice, episodic memory, cognitive modeling
Presentation type: Oral presentation / Talk
Session: Drift Diffusion Modeling

Paving the way for Ecodriving Studies in an Electric Vehicle Driving Simulator – The Ecodriving Test Park

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Energy-efficient driving (ecodriving) in electric mobility is crucial on an individual and societal level. Yet, drivers struggle to learn and sustain ecodriving. One approach to evaluate and study ecodriving interventions are driving simulator experiments. This research aims to develop and analyze a series of driving simulation test cases (ecodriving test park) for ecodriving. Driving simulators offer controlled environments. However, commonly used classifications of, e.g., “urban” or “rural” environments are limited regarding the interpretability of how cognitively and physically complex a scenario really is. It is necessary to establish a taxonomy based on situation characteristics and understand the implications of these characteristics on ecodriving behavior and driver experience.
We developed driving scenarios for simulator experiments that operationalize the following characteristics: energy relevance, defined as the disparity between the most and least energy-efficient, yet legally and socially compliant driving styles, information processing demands, as cognitive demands due to information perception, comprehension, and decision-making, and vehicle control demands, as cognitive and physical demands due to lateral and longitudinal control requirements and their time budget (based on Fastenmeier, 1995).
In an initial study for evaluation, we gathered empirical driving and questionnaire data and developed manipulation check indices. The results served as a basis for scenario selection for the final test park to encompass a broad range of complexities while maintaining high energy relevance. Through the evaluation, other potential modifications to the test park were derived.
Keywords: engineering psychology, driving simulator, ecodriving, situation complexity, driving scenario
Presentation type: Oral presentation / Talk
Session: Experimental Engineering Psychology and Human Factors II

Exploring the Generalizability of Oculomotor Control Paradigms in Assessing Natural Visual Behavior

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Most research uses simplified paradigms with artificial stimuli to gain insights into visually-guided behavior. Despite the advantages of stringent experimental control and the granular analysis of distinct mechanisms, a critical assumption remains largely untested: the extent to which evidence gathered in artificial settings is reflective of more complex natural behaviors. To address this, we asked: how much of the variance across observers in natural free-viewing behavior can be explained by established artificial paradigms assessing oculomotor control? A group of 50 observers completed a battery of tasks ranging from standard measurements of saccade or pursuit accuracy with simple, artificial stimuli to the free-viewing of naturalistic images or videos. Our findings revealed consistent individual differences in performance in each of the tasks; however, limited correlations were observed between them. Individual differences in saccade latencies for artificial stimuli accounted for approximately 10% of the observed variance in fixation durations in natural scenes. Similarly, saccade or pursuit accuracy did not show a strong relationship to the saccade amplitudes or frequency of pursuit in dynamic scenes. Notably, screen time on smartphones was not associated with measures in artificial tasks but demonstrated a significant correlation with fixation durations during free-viewing of natural scenes. Observers with increased screen time exhibited shorter fixation durations, highlighting an intriguing link between technology use and naturalistic gaze behavior. Our results emphasize that natural stimuli and tasks encompass features and components that are missing in artificial tasks with simple stimuli, thereby challenging the frequently assumed generalizability of findings derived from such paradigms.

Keywords: Individual Differences, Eye Movements, Natural Behaviour
Presentation type: Oral presentation / Talk
Session: Natural Scene Perception

Comparing the Experience of Art Appreciation in a Gallery and a Shop Context using VR

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When people engage with art, they accept and even embrace feelings they tend to avoid daily. These include, among others, the experience of negative emotions, peak emotions, cognitive challenges, semantic instability, uncertainty, and immoral behaviour. For about 300 years, philosophers and psychologists of art have argued that when people engage with objects identified as art, they adopt a cognitive mode distinct from everyday processing that affects subsequent interaction with these objects. We addressed this experimentally through a VR (virtual reality) study where 32 participants freely interacted with the same nine unfamiliar artistic pictures from a variety of styles presented either in an art (gallery) or everyday (shop) context. Participants expressed their experiences via a think-aloud protocol and the Art Reception Survey (ARS). Additionally, the dynamics of viewing distances were recorded, and participants also completed open-ended questions and questionnaires immediately after the VR experience and two weeks later. While the quantitative evaluative data did not yield significant differences between both contexts, the qualitative data revealed fundamental experiential differences suggesting that gallery-participants approached and processed the artworks more deeply, associatively, affectively, and less practically. We conclude that the usage of VR offers a great potential for understanding the deeper nature of the art experience.

Keywords: Virtual Reality (VR); empirical aesthetics; art context; mode of art experience (MAX); museum; aesthetic distance; semantic instability (Steins); disinterestedness; meaning.
Presentation type: Oral presentation / Talk
Session: Experimental Aesthetics I

Reassessing the unhealthy = tasty intuition: A critical examination and future directions

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It is a popular belief that lay theories guide human decision-making. One example of such a lay theory is that unhealthy foods, as compared to healthy foods, are considered as tastier than healthy foods. This unhealthy = tasty intuition has been the cornerstone for the development of effective public health initiatives and awareness campaigns since its conception in 2006. Although some studies have been able to replicate the unhealthy = tasty intuition, other studies have cast doubt on the universality of this intuition. We replicated the original procedure to test the unhealthy = tasty intuition with a representative sample (n = 400) of the Austrian population by age and gender (study 1). To accomplish this, we used an implicit association task, where participants categorised pictures of foods as healthy or unhealthy and words as indicating a good or bad flavour. With this procedure, we measured the association between unhealthy/healthy and tasty/not tasty. Our results do not indicate an unhealthy = tasty intuition but the opposite: Participants associated healthy foods with better flavour. This result was found across all age groups and genders. In a follow-up study (study 2), we investigate whether older lay theories (unhealthy = tasty) are replaced by emerging lay theories about novel foods or foods with particular labels regarding their ingredients. In particular, we address the question of whether foods labelled as vegan or vegetarian are perceived as tastier, healthier or more sustainably produced. Data collection in a representative Austrian sample is currently ongoing.

Keywords: implicit associaton test, lay theories, emerging lay theories, replication study
Presentation type: Poster Presentation
Session: Decision Making

Unraveling others preferences in bargaining through eye movements

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Eye movements are intricately coupled with decision-making, serving as a window into a decision-maker's attentional processes. In social settings, we intuitively use this principle to infer other persons' preferences while they are deciding. Showing the gaze pattern of one participant to another in a coordination game leads them to better understand each other's preferred choices. In our study, we are using this ability to test whether a seller can reach better agreements with a buyer if they can see their eye movements in a cooperative bargaining setting. In the task, the seller tries to sell products with multiple attributes to a buyer. The seller's goal is to figure out the buyer's preference to be able to offer (and ultimately sell) appropriate products. For making such inferences, the seller has access to choices, response times, and eye movements. We hypothesize that sellers can use buyers' eye movements to infer their preferences, thereby improving the efficiency and outcomes of bargaining processes.

To explore how sellers can learn from buyers' decisions, we developed a model for the buyer that assumes a probabilistic cutoff value at which the buyer accepts an offer. We also designed a learning model for sellers according to which the seller infers attribute preferences from the buyer's decisions. Simulation results suggest that sellers relying on feedback from buyers' choices perform better. The study is currently in the piloting stage, and we expect to be able to present the data from the main experiment by the start of the conference.

Keywords: Decision-making; Eye-tracking, Social decision making
Presentation type: Poster Presentation
Session: Decision Making

Relating Frequentist and Bayesian Hypothesis Tests Using Regions of Support

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Hypothesis testing is a widely used tool in inferential statistics. Yet, hypothesis tests have their problems and can cause sever misinterpretations. We argue, that one reason for these persistent problems is the following discrepancy: While hypothesis tests are *explicit* on which parameter-values are theoretically contained in each hypothesis, they are usually *not explicit* on which parameter-values would in a practical setting lead most likely to which test outcome. For example, a standard t-test explicitly tests against a zero effect under the null hypothesis. However, in practical settings the test will also likely not refute small 'true' effects (depending on sample size). To make these test-characteristics explicit we introduce the concept of Regions of Support (ROS) which indicates which 'true' effects likely result in which outcome of a hypothesis test given the sample size (or, more generally, precision). ROS can serve both as a check for researchers' expectations as well as a comparison of different tests. We evaluate standard Bayesian and frequentist point-null tests as well as interval (equivalence) tests on a simple, two independent samples setting. Interestingly, for interval tests our ROS analysis finds that Bayes factors (which have previously been considered as being the best choice) suffer from an undesirable bias towards accepting the null hypothesis. We argue that other methods such as the Bayesian highest density interval (HDI) with explicit specification of the region of practical equivalence (ROPE) or its frequentist analogue (confidence interval with ROPE) do not show this bias and might be preferable.

Keywords: Hypothesis testing, Equivalence testing, Bayesian, frequentist, Bayes Factor, HDI+ROPE, Effect sizes
Presentation type: Poster Presentation
Session: Methods

CANCELLED - Navigating Emerging Technologies: The Crucial Role of Adaptation

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Adapting to new technologies empowers individuals to effectively navigate evolving environments, leading to enhanced performance, diminished mental workload, and increased comfort. Drawing from evolutionary biology, we distinguish between three dimensions of adaptability: Trait Adaptability, reflecting a stable characteristic; State Adaptability, indicating immediate adjustment extent; and Adaptation, encapsulating the ongoing adaptive process. Our insights, gleaned from four distinct studies, delve into trait adaptability in the use of new workplace technologies, state adaptability/the process of adaptation in the use of simulators, and a unique facet in adaptation, intention to adapt, in the realm of automated driving. Our research indicates that individuals' trait adaptability significantly influences the level of trust placed in a technology. Regarding state adaptability, we identified significant differences between subjectively perceived and objectively measured. Intriguingly, neither age nor prior experience with the technology accounted for this discrepancy. However, individuals exhibiting limited adaptation to a simulated environment spent considerably less time in the simulator, primarily due to the onset of simulator sickness. In addition, we show that attitude toward using automated public transportation and subjective norm predicts individuals' intention to adapt. With 'intention to adapt', we increasingly focus on the behavioural change that is necessary for a successful implementation of new technologies.
In summary, our research underscores the crucial role of adaptation in our interactions with emerging technologies. This role remains pivotal in shaping human behaviour within an increasingly intricate environment, irrespective of the specific technology in use.
Keywords: Adaptability, Technology, Trust, Simulator, Automated Driving, Workplace
Presentation type: Oral presentation / Talk
Session: Experimental Engineering Psychology and Human Factors I

Follow Me - follow You? Interacting with a Human But Not a Computer Motivates Conflict Adaptation in Interindividual Response Conflict

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Response conflicts and their sequential adaptations are typically investigated for conflicts between an instructed and a competing automatic response tendency, triggered by different stimulus features. In the present study, comprising six Experiments, we investigate conflicts between a participant's and a co-actor's competing response goals and their sequential adaptations in a novel paradigm. Specifically, the participant and a co-actor (another human or the computer) move a target relay-like in two steps from the bottom center to the top left or right corner of the computer-screen. In a first block, participants must always follow the co-actor's goal choice (follower training; Experiments 1, 2). In the critical second block, participants are free to follow either's goal choice. Experiments 3-6 explored modifications of the basic paradigm (order of blocks; leader training; humanized computer co-actor). In all six Experiments, participants showed congruency effects whereas conflict adaptation effects were almost exclusively found for second blocks (mostly free-choice) and only if participants cooperated with a real or imagined human co-actor. Thus, the 'relay paradigm' allows to examine socially triggered response conflicts between co-actors in different roles (follower, leader, decider) and settings (lab or online) and offers new insights into the functionality of conflict adaption.

Keywords: Cognitive Control, Action Control
Presentation type: Poster Presentation
Session: Cognitive Control and Conflict II

On the structure and retrieval of task-set representations in task switching

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Effective goal-directed behaviour requires not only selecting the correct response to stimuli in our environment, but also requires selection of the correct stimulus upon which to act. Many (but not all) studies of task switching require the selection and maintenance of mental representations of response options (so-called "response-sets"), but they do not require the selection and maintenance of mental representations of stimulus selection (so-called "stimulus-sets"). In the current experiments, a task switching paradigm was employed where the relevant stimulus-set (which stimulus to respond to) and response-set (how to respond to that stimulus) independently either repeated or switched. Central to the current investigation was to understand whether response-set and stimulus-set can be controlled independently, or whether they are bound together into a single representation. The theoretical framework of ECTVA (a computational model of dual-task control; Logan & Gordon, 2001) makes the strong claim that response-set and stimulus-set are unique control parameters that can updated independently. Predictions from ECTVA were used to design several experiments testing whether response-set and stimulus-set can be updated independently. All experiments confirmed ECTVA's predictions of an under-additive interaction between response-set and stimulus-set sequence, diagnostic of independent updating. However, limitations to this independent updating arose when participants were encouraged via preparation manipulations to selectively prioritise response-set or stimulus-set updating. The results are discussed in terms of other views on the structure of task-set representations, as well as how these representations are retrieved from memory to guide action.

Keywords: task switching, cognitive control, task-sets, computational model
Presentation type: Oral presentation / Talk
Session: Feature binding in action control and beyond I: How binding contributes to stimulus-response learning, cognitive control, and event segmentation

How new methods in developmental cognitive neuroscience illuminate the development of Theory of Mind

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It has long been held that our capacity to understand mental representations, referred to as Theory of Mind (ToM), emerges around 4 years, when children begin to understand that beliefs may differ from reality. This view, however, was questioned by evidence that already preverbal infants predict how others will act in line with their mental states. When does Theory of Mind develop and what explains this discrepancy? With structural MRI in children aged 3 to 4 years, we showed that different neural networks support verbal belief reasoning at 4 years and non-verbal success in the infant tasks. Verbal false belief reasoning is supported by the maturation of regions and connections of the Default Network, also involved in Theory of Mind in adults. In contrast, infant Theory of Mind tasks are associated with the maturation of the Salience Network involved in social attention processes. Using frequency tagging with EEG, we show that infants' (and adults') neural visual processing of objects is enhanced if other agents see these objects. I propose that this offers a cognitively efficient way of considering the things that others see, available from infancy, as an alternative to more effortful and later-developing verbal ToM.

Keywords: Theory of Mind, false belief understanding, perspective taking, early childhood, social cognitive development, developmental cognitive neuroscience
Presentation type: Oral presentation / Talk
Session: Advances in Developmental Cognitive Neuroscience

CANCELLED - Successful prediction can promote an illusory sense of comprehension

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We propose that individuals incorrectly interpret their success in predicting an event as an indication that they understand the event's underlying mechanism or process. We term this illusion prediction-comprehension bias (PCB) and conceptually locate it within the framework of reverse inference logic. In a set of five experiments (N = 851), we demonstrate this bias and identify three psychological factors that produce it: The feedback participants receive about their prediction accuracy (Experiment 1), the consistency with which a cause and its effect are presented together (Experiment 2), and the fluency of an observation brought about by the number of times it is repeated (Experiment 3). In Experiment 4, we directly replicate the results of Experiment 3 and explore the bias's underlying mechanism: We find first evidence for that respondents use the perceived validity of inferring prediction from comprehension (a sound inference) as an indicator for when to draw the reverse inference (inferring comprehension from prediction) that underlies the PCB. In Experiment 5, we corroborate the PCB-mechanism by demonstrating that experimentally manipulating the validity of inferring prediction from comparison affects how strongly participants exhibit the PCB. Failed reverse inference logic seems to substantially account for the PCB.

Keywords: bias, prediction, comprehension, reverse inference
Presentation type: Oral presentation / Talk
Session: Metacognition and Problem Solving

Context-specific adaptation for head fakes in basketball: A study on player-specific fake-frequency schedules

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In basketball games, it is important to spontaneously adapt to the individual fake frequency of different opponents. This study investigated if participants (n = 34) are able to adapt to player-specific fake-frequency schedules on a trial-by-trial level. Therefore, stimulus material of three different basketball players was used, and each player was presented with a different frequency of head-fake trials (i.e., 20%, 50%, 80%). The analysis of the mean RTs revealed that the head-fake effect was present for 20% head fakes and disappeared for 50% head fakes. Also, the head-fake effect reversed (though not significantly) for 80% head fakes. Results indicate that participants adapted to the individual frequency of head-fake usage of the basketball player displayed in a trial. We further analyzed whether this result can be explained by stimulus-driven episodic retrieval of previous responses that were executed at the last occurrence of the stimulus. Indeed, the findings from a multilevel modelling technique point out that for the RT data, the interaction between type of pass and fake frequency (which is indicative for player-specific adaptation of the head-fake effect) was no longer significant as we statistically controlled for stimulus-driven episodic retrieval effects. This implies that episodic response retrieval accounts for a substantial amount of variance in the head-fake effect. By transferring these findings to head-fake effects in basketball, players can increase the efficiency of a head fake by repeating the same head movement but changing the direction of the pass.

Keywords: episodic retrieval, conflict processing, head fake
Presentation type: Oral presentation / Talk
Session: Episodic retrieval of recent stimulus-response episodes as a source of cognitive control and learning

Is a neutral face emotionally neutral? As per perceptual load paradigm depends on the emotional context.

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Perceptual load theory proposes that processing of distractor stimuli is determined by the level of perceptual load, with low distraction (assessed by flanker interference) at higher load levels. However, He and Chen (2010) observed that familiar faces caused flanker effects even at higher load levels compared to unfamiliar ones. We expected a comparable pattern for emotional faces, that is, happy or angry faces should distract still at load levels at which neutral faces ceased to distract. In our experiments, we asked participants to categorize names according to gender. The target was presented with 1, 3, 5, or 7 pseudo-names (i.e., the variation of perceptual load) accompanied by a face distractor. In Experiment 1a, we manipulated emotion: happy vs. neutral; in Experiment 1b, we compared angry vs. neutral. Both happy and angry faces caused significant flanker effects at load levels 1 and 2, which were no longer significant at levels 3 and 4. Unexpectedly, neutral faces' congruency effects changed depending on whether they were presented with happy or angry faces, thereby seemingly indicating that neutral faces have less distraction potential than happy faces but more distraction potential than angry faces. To clarify, Experiment 2 was a full replication of Experiment 1a,b. Again, happy and angry faces showed comparable results: we found clear flanker effects at level 1 and 2, reduced (but still significant) effects at the higher levels. The neutral faces, however, were again inhomogeneous. We will discuss these results considering how neutral faces might be ambiguously perceived depending on context.

Keywords: Perceptual load, Emotional faces, Flanker effects
Presentation type: Oral presentation / Talk
Session: Facial Expressions I

Task instructions moderate the impact of emotional expression and group membership in the affect misattribution procedure

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The expresser's emotion and group membership of an unrelated (prime) stimulus can jointly affect evaluations in implicit paradigms. However, the two features seem differently weighted, with the assumption that task relevance determines their influence, at least in the evaluative priming paradigm (Craig, Lipp & Mallan, 2014). However, Gawronski et al. (2010) suggested, that several features are processed in parallel in the Affect Misattribution Procedure (AMP) without much weighting by task instructions. We pursued this line of research by examining whether and how task instructions influence the effect patterns of emotion and group features in the AMP. Primes consisting of ingroup and outgroup faces displaying happiness and fear were followed by ambiguous, neutral targets, consisting of masked, computer-generated faces. As a typical AMP instruction, in Experiment 1A, participants were instructed to report whether they found the target faces (more or less) pleasant or unpleasant than the average. In Experiment 1B, they were instructed to report whether or not they saw fear in the target faces, with the aim of increasing the attentional focus to the emotional expression as well as to a possible fearful emotional reaction towards an outgroup member. The emotion and group characteristics of primes interactively influenced target evaluations in Experiment 1A, consistent with the assumptions of Gawronski et al. (2010). In Experiment 1 B, however, neither emotion nor group characteristics modulated target evaluations, despite the task relevance of emotion was increased. The influence of contextual cues, such as instructions in implicit paradigms will be discussed.

Keywords: Emotional expression, group membership, face perception, affective misattribution procedure
Presentation type: Oral presentation / Talk
Session: Facial Expressions I

Gaze Interaction and Social Connectedness

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Eye gaze is an important component of nonverbal communication, as it can convey information about attention, intentions, and attitudes. In a gaze-contingent eye tracking paradigm, we examined how different gaze interaction patterns of social agents impact social connectedness and trust. In two experiments, participants moved their eyes towards one of several female faces presented peripherally in each trial. The fixated face responded by either returning or averting their gaze. We varied response contingencies of the interaction partners, creating identities that either returned or averted their gaze more often. After interacting with each partner multiple times, participants estimated how often their gaze was returned by each interaction partner and rated how connected they felt to each of them. In Experiment 1, participants then identified letters depicted on the forehead of pairwise presented faces of the interaction partners in a free-choice task to determine whether they had general preferences for particular identities. In Experiment 2, they played one-shot trust games in the role of trustors with each interaction partner.
Participants were able to correctly discriminate the gaze return rate of all identities in both experiments. However, in both experiments, social connectedness ratings were not significantly related to the actual gaze return rates, but were higher when participants subjectively estimated that their gaze was returned more frequently. In the free-choice task, there was no significant preference for faces with higher gaze return rates, but participants entrusted significantly more money to those identities in the trust game.
The high discriminative ability of subtle differences in gaze return rates indicates a strong sensitivity to the gaze behavior of social interaction partners. The results further suggest that perceived gaze communication patterns might play a vital role in building trust and social connectedness in nonverbal interactions.

Keywords: Eye Movements, Social Connectedness, Gaze, Trust, Contingency Learning
Presentation type: Oral presentation / Talk
Session: Harnessing Gaze - Eyes for Information, Communication, and Understanding

How experienced task structure influences the formation and use of task representations during multi-task learning

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Different training conditions can have a profound influence on human performance, learning, and retention. Inspired by recent neuroimaging and modeling studies on the geometry of task representations, we explored how the sequencing of stimulus versus task information (context), and the use of identical versus distinct response labels across tasks, could influence task learning and accuracy. We hypothesized that presenting stimuli before contextual cues and employing distinct response labels for each task would foster more high-dimensional task representations, thought to improve retention of task knowledge. We evaluated multi-task learning in four groups (Context-first with/without Response labeling, and Stimulus-first with/without Response labeling) where participants first learned through trial-and-error to categorize stimuli differently depending on three different contexts. During a test phase without feedback, participants continuously switched between the three tasks. Accuracy significantly decreased from training to test, notably influenced by Response labeling, but not Presentation order. Task-specific response labels helped retain task information better, particularly in the stimulus-first group. We conclude that employing response labels and presenting stimuli first has the potential to improve task representations and multitasking accuracy. In a subsequent study, we explored whether learned task information could also be repurposed more efficiently to entirely new tasks, depending on initial Response labeling. Indeed, subjects that learned better with response labeling also performed better in a new, value-based decision-making task. Together, our findings highlight how different training interventions can influence the adaptability and transferability of task knowledge in a multi-task environment.

Keywords:
Presentation type: Oral presentation / Talk
Session: Multitasking and Cognitive Control II

Breaking New Ground in Computational Psychiatry: Model-Based Characterization of Forgetting in Healthy Aging and Mild Cognitive Impairment

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Computational memory models have proven effective in adaptive learning environments for assessing learners' memory capabilities. However, these models have not been widely applied in clinical settings. Evaluation of memory loss still heavily relies on extensive neuropsychological testing performed by neurologists or psychiatrists, especially in the context of progressive neurodegenerative disorders. Current evaluation tools lack the necessary reliability, convenience, and repeatability to effectively capture key dynamics of memory decline, including the unique and changing nature of memory over time. The goal of this study was to predict and monitor memory decline in individuals diagnosed with Mild Cognitive Impairment (MCI) using a model-based adaptive fact learning system. Participants, aged 55 to 85 years, were divided into two groups based on their cognitive classification and completed weekly online learning assessments at home, tracking their individual *Speed of Forgetting* (SoF) across various study materials. The results offer compelling evidence that these tools can diagnose mild memory impairment with an impressive accuracy rate of over 85% in just an 8-minute learning session. These findings not only enhance our understanding of the nature and progression of memory decline but also bear significant implications for the early detection and management of conditions such as Alzheimer's disease and other forms of dementia.

Keywords: Memory, Forgetting, Dementia, Clinical Translation, Computational Psychiatry
Presentation type: Oral presentation / Talk
Session: Adaptive Retrieval Practice and its Applications in Education and Health

Metacognition and the Event Completion Paradigm: The Role of Metacognitive Sensitivity During Event Perception

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Event completion describes the finding that observers often report having seen some visual information that was missing (e.g., the moment of ball contact) if it is causally implied (e.g., by seeing a ball flying). We investigate whether the accuracy of observers' decisions depends not only on the precision of their mental representation of the event, but also on their confidence in their cognitive processes. While confidence is often measured alongside accuracy in event perception research, to our knowledge, the concepts of accuracy and confidence were never put into relation. Leveraging Signal-Detection Theory measures, we calculate metacognitive sensitivity (meta-d'), a bias free measurement of the confidence-accuracy relationship, and apply it to the event completion paradigm. We will present both a re-analysis of existing data from the event completion paradigm (Huff et al., 2017; Papenmeier et al., 2019) using meta-d' and the results of a new study (pre-registered: https://aspredicted.org/BK7_XH9) using the event completion paradigm that is specifically designed to ensure accurate measurement of meta-d'.Participants watch soccer video clips and indicate whether they have seen (including confidence rating) a critical moment of ball contact that is either causally implied (e.g., the ball flying; causal continuation) or not (e.g., cheering supporters; non-causal continuation). In half of the trials, we omit this critical moment of ball contact. We expect that detection accuracy and metacognitive sensitivity is lower in the causal than in the non-causal condition. Our research will contribute to a better understanding of peoples' insight into the accuracy of their judgments during event perception.

Keywords: event completion, metacognitive sensitivity, confidence, Signal-Detection Theory
Presentation type: No-Data Poster
Session: Metacognition

The effect of native script on foreign language reading fluency

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Learning to read fluently is an important everyday skill and is essential for reading enjoyment and academic development. As such, it is important to understand what bottlenecks may prevent readers from developing fluency. Here, we examine bilingualism as a predictor of reading fluency. Specifically, it has been observed anecdotally that reading fluency may not develop, if readers did not have extensive exposure to the script during childhood (Abazdi, 2012). To test this observation more systematically, we conducted an online study. We investigated reading speed in 60 adults, reading in German, whose native language is either Albanian or Greek. Albanian is written in the same Latin script as German, while Greek is written in a different, albeit still alphabetic script. As a potential mediator, we included a task measuring fast letter recognition: A Reicher-Wheeler task, where participants identified Latin letters that were presented briefly as part of a consonant string. The results provide insights into factors which lead to reading fluency, and the role of early letter-recognition processes as a potential bottleneck.
Keywords: Bilingualism; reading fluency; Reicher-Wheeler
Presentation type: Oral presentation / Talk
Session: The Impact of Language Experience on Learning and Memory

Getting familiar with odors enhances odor paired associate memory

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In olfactory paired-associate (PA) studies, odors are paired with target stimuli in an initial training session. In a testing session, the odor cues are presented and subjects are asked to recognize the target (among multiple foils) that was initially paired with the odor. Previous olfactory PA studies showed that odors are less effective associative cues than stimuli from other sensory modalities. It has been suggested that odor familiarity might improve odor memory by assisting odor discrimination and facilitating PA memory acquisition. In the current study, we investigated whether getting familiar with odors would also enhance the effectiveness of odors as cues in an olfactory PA test. We designed an experiment with a familiarity manipulation to evaluate the role of odor familiarity in PA memory with odors. There were two groups of participants in the experiments: an experimental group who got familiarized with half of the pre-rated odors (16 odors, 8 high- and 8 low-familiar) in four weeks, and a control group. Both groups ran a PA memory paradigm in which they associated 32 odors (16 high- and 16 low-familiar odors) with black and white complex shapes. We predicted an interaction between pre-rated odors and familiarity training whereby training should only help low familiar odors in such a way that familiarity training would increase their effectiveness in target retrieval over untrained low-familiarity odors. These results provide further evidence for odor familiarity as one of the critical features in olfactory processing and memory.
Keywords: Olfactory memory; Odor familiarity; familiarity training; Paired-Association Memory
Presentation type: Oral presentation / Talk
Session: Cognitive and Neural Processes Underlying the Perception of Odors

Auditory stream segregation in the irrelevant speech effect: A preregistered replication of Jones and Macken (1995)

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A classical study by Jones and Macken (1995) revealed that segregating a changing-state sequence of sounds into distinct steady-state sequences emanating from different spatial locations decreases the detrimental effects of irrelevant speech on short-term memory. Since this study is important in asserting that spatial auditory stream segregation determines whether a steady-state or a changing-state percept is formed, and since it has never been replicated by another laboratory, a preregistered replication was initiated. Participants were exposed to mono and stereo versions of task-irrelevant steady-state ('J-J-J…') and changing-state utterances of letters ('V-J-X…') while attempting to memorize a sequence of visually presented letters for serial recall. In the monophonic condition, all sounds were played diotically (i.e. through both headphone channels) resulting in a single auditory stream localized in the center of the head. In the stereophonic presentation mode, by contrast, the sequence was played through the left, right, and both headphones, thereby allocating each letter to a fixed spatial position, thus potentially forming three distinct auditory streams. The results show that while the stereophonic condition significantly attenuates disruption by irrelevant speech, as in the original study, this beneficial effect is not as large as reducing it to the level of a monophonic steady-state control condition, thus suggesting that spatial auditory stream segregation may not have been perfect.

Keywords: Short-Term Memory, Irrelevant speech effect, Changing-state effect, Serial Recall, Streaming-by-location, Auditory distraction
Presentation type: Poster Presentation
Session: Language

Investigating The Possible Bias Against Lévy Flight Model in Diffusion Model Paradigm

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The Diffusion Decision Model (DDM) is widely used in binary decision tasks, breaking down response times into meaningful psychological parameters. However, DDM has limitations, particularly in cases of fast errors under speed instructions. The model incorporates additional across-trial variability parameters to explain fast errors which are hard to recover. In contrast, the Levy Flights model (Voss et al., 2019) addresses fast errors with jumps in evidence accumulation which can occur in first miliseconds of decision process. Introducing the stability parameter, alpha, this model is suggested to better capture human decision-making. We propose that in cases where the true data-generating model is Levy Flights, DDM may introduce biases during interpretation. A preliminary study in the project using fast-dm (Voss & Voss, 2007) revealed a systematic bias against threshold separation and non-decision time parameters. To further investigate, we conducted a simulation study via Bayesflow (Radev et al., 2020), training 4 separate networks with standard and full models for a parameter recovery study. That indicated DDM's parameter recovery was not healthy when data comes from Levy Flights. Our ongoing goal is to provide a comprehensive picture of the possible bias against Levy flights model in Diffusion model framework.

Keywords: Diffusion Model, Levy Flights, parameter recovery, evidence accumulation
Presentation type: Oral presentation / Talk
Session: Drift Diffusion Modeling

Looking at Nothing during Preference Decisions from Working Memory

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„Looking at Nothing“ (LaN) - gazes to locations that do no longer contain information - occurs both when location-associated information is retrieved from long-term memory (LTM) or accessed and consequently further activated in working memory (WM). WM activation can result from information integration when deciding between alternatives: LaN increases to the (empty) location of the alternative about to be chosen. The goal of the reported experiment was to demonstrate LaN driven by WM of to-be-compared alternatives even without LTM retrieval and to explore changes in LaN across trials when LTM develops for repeated alternatives. Participants repeatedly performed binary decisions. The six alternatives (cars) were characterized by four textual attributes presented in distinct geometrical frames. In each trial, two alternatives with their respective attributes were visible next to each other for 4 or 5 s (full interval). Then the attribute information disappeared (empty interval) and participants indicated their preferred alternative by response keys. In addition, participants rated the single alternatives as well as the subjective importance of the individual attributes.
Higher rated alternatives were chosen more frequently with increasing number of decisions and difficult decisions (between similarly rated alternatives) took longer. During the empty interval, the relative dwell time on the chosen (vs. the other) alternative, as well as the best-rated attribute (vs. other attributes) was higher, showing that LaN occured even when no LTM representation existed yet. As participants memorized the alternatives, LaN more clearly reflected attribute relevance while response time decreased.

Keywords: looking at nothing, eyetracking, decision, working memory
Presentation type: Oral presentation / Talk
Session: Decision Making I

Understanding mismatch negativity reductions in schizophrenia through the lens of predictive coding

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Background
Mismatch negativity (MMN) reductions are among the most reliable biomarkers for schizophrenia and have been associated with increased risk for conversion to psychosis in individuals at clinical high risk for psychosis (CHR-P). Here, we adopt a predictive coding approach to develop a mechanistic model of MMN reductions in CHR-P individuals and patients early in the course of schizophrenia (ESZ).

Methods
Electroencephalography (EEG) was recorded in 38 CHR-P individuals (15 converters), 19 ESZ patients (≤5 years), and 44 healthy controls (HC) during three different auditory oddball MMN paradigms including 10% duration-, frequency-, or double-deviants, respectively. We modelled sensory learning with the hierarchical Gaussian filter and extracted precision-weighted prediction error trajectories from the model to assess how the expression of hierarchical prediction errors modulated EEG amplitudes over sensor space and time.

Results
Both low-level sensory and high-level volatility precision-weighted prediction errors were altered in CHR-P and ESZ groups compared to HC. Moreover, low-level precision-weighted prediction errors were significantly different in CHR-P that later converted to psychosis compared to non-converters.

Conclusions
Our results implicate altered processing of hierarchical prediction errors as a computational mechanism in early psychosis consistent with predictive coding accounts of psychosis. This computational model appears to capture pathophysiological mechanisms relevant to early psychosis and the risk for future psychosis in CHR-P individuals, and may serve as a predictive biomarker and mechanistic target for novel treatment development.

Keywords: mismatch negativity, prediction errors, EEG, schizophrenia, clinical high risk for psychosis, hierarchical Gaussian Filter, sensory learning
Presentation type: Oral presentation / Talk
Session: How do auditory and speech processing alterations contribute to symptoms in psychosis: a predictive coding approach

CANCELLED - Cupid Uncovered - An Eye Tracking and Visual Saliency Study on the Restoration of Vermeer's "Girl Reading a Letter at an Open Window"

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The oil painting "Girl Reading a Letter at an Open Window" by Johannes Vermeer underwent a major restoration completed in 2021. Thereby, a painting of cupid on the back wall, which had been overpainted after Vermeer's death, was revealed. The discovery of this painting within a painting changed not only the composition, but also the semantic interpretation of the artwork. Many scholars argue that the display of cupid reveals the nature of the letter as a love letter. We performed eye tracking and a visual saliency study of digital copies of the painting to investigate this semantic change. Thus, we defined five areas of interest: foreground, reader, window, letter, and cupid/wall. While we monitored their eye movements, 67 lay people freely viewed (A) the painting with the blank back wall and (B) the restored version with the painting of cupid (balanced study design) for 10 seconds. Comparing both versions, the painting of cupid drew visual attention (measured by total fixation duration) mainly from the letter. Additionally, we performed an objective visual saliency analysis. Visual saliency turned out to be rather similar between both versions. In sum, participants paid less visual attention to the letter in the cupid version (eye tracking) while the visual saliency was not significantly different between both versions (saliency). Our results are in line with the interpretation that the display of cupid removes the letters' ambiguity. We speculate that the change of visual attention is mainly driven by semantic features and not by visual image properties.

Keywords: Aesthetics, Art, Saliency, Eye Tracking
Presentation type: Oral presentation / Talk
Session: Experimental Aesthetics I

Does social distance matter? Self-reference effect on episodic memory in a within- and a between-subjects design

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The self-reference effect (SRE) refers to a memory advantage for information processed in relation to the self. Self-referential encoding seems to especially enhance recollection, the subjective "feeling of remembering" and retrieval of episodic detail. Improved memory, and a correspondingly smaller SRE, are also typically observed after reference to a close, compared to a distant other person. We investigated whether the SRE and the modulating effect of social distance would occur regardless of factorial design, that is, whether encoding was manipulated within or between subjects. Participants judged the descriptiveness of trait words regarding either themselves, someone close to them, or a distant acquaintance, followed by a recognition memory test and Remember/Know/Guess-judgments. In the within-subjects design (N=152), a third of trials was assigned to each reference task (self, close or distant other) in a mixed block. In the between-subjects design (N=155), the reference task always remained the same, with each participant only performing one type of reference. We replicated the SRE in both design types: Recognition performance and recollection estimates were higher after self- than either close or distant other-reference. However, we only observed a memory advantage for close- over distant other-reference when encoding was manipulated within participants, with no effect of social distance in the between-subjects design. We consider potential roles for sampling error and context effects on social cognition in producing these differing patterns. Our findings suggest that practical choices such as the type of experimental design may have important implications for the SRE.

Keywords: memory, self, self-reference, recollection, social cognition, experimental design
Presentation type: Poster Presentation
Session: Memory and Learning I

Feature-based correspondence in pre-school children

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By connecting objects across space and time our visual system is able to perceive objects in motion and to structure our environment. Studies with apparent motion displays in adults have shown that spatio-temporal as well as feature information is used to solve the correspondence problem, i.e., the integration of different object instances into one percept . The aim of our study was to examine how this integration process develops, specifically, whether children solve correspondence in the same way as adults. We used the Ternus Display, an ambiguous apparent motion display, in which two objects are presented in a first frame, followed after a variable inter-stimulus interval (ISI) by two objects shifted by one position to the side. This display is ambiguous, as it can be perceived as both objects moving together (group motion) or one object moving across the other (element motion), depending on how correspondence has been solved. We manipulated the ISI and used a form-based feature bias, such that the form of the objects across frames was either compatible with group or with element motion. We asked children between the age of 5 and 7 to report their motion percept. Our results showed an influence of the ISI and feature information. In contrast to our adult control group, however, the feature effect was limited to the group bias condition. Our results suggest that children solve correspondence based on ISI and feature information, but not in the same way as adults do.

Keywords: vision, development, correspondence problem, apparent motion
Presentation type: Poster Presentation
Session: Perception II

Capacity limits of event files

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Upon a behavioral response, associations between stimuli and the response are integrated in a temporary memory trace named ‘event file’. Reencountering a component causes the retrieval of the entire event file, leading to interferences and performance impairments if only some parts are repeated and others are changed (partial-repetition costs). The stored conjunctions can not only include bindings between target and reaction, but also between task-irrelevant distractors and the response (distractor-response binding). Past research suggested that these links can be formed effortlessly without assumptions of capacity limitations. We specifically investigated the limitations for such bindings by testing capacity-related boundaries with different set sizes of polygon stimuli in a distractor-response binding paradigm. As a result, binding effects observable at a small set size were absent at higher set sizes, indicating limited capacities for event files.

Keywords: binding, capacity, working memory
Presentation type: Poster Presentation
Session: Memory and Learning I

A common representation of brightness and loudness and the near-miss to cross-modal commutativity

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We are able to compare the loudness of a tone to the brightness of a visual stimulus, and vice versa. This may be explained by the long-standing assumption of a common representation of perceived intensity that is shared by almost all modalities. Luce, Steingrimsson, and Narens (2010, Psychological Review, 117, 1247-1258) formalize this idea within a cross-modal version of the theory of global psychophysics, which can be empirically tested in a parameter-free way through the axiom of cross-modal commutativity of successive magnitude productions. The paper provides a theory-based analysis of data on this axiom collected by Ellermeier, Kattner, and Raum (2021, Attention, Perception, & Psychophysics, 83, 2955-2967), which is grounded on a recently suggested extension of the global psychophysical approach to cross-modal judgments (Heller, 2021, Psychological Review, 128, 509-524). This theory assumes that stimuli are judged against respondent-generated internal references which are modality-specific and potentially role-dependent (i.e., sensitive to whether they pertain to the standard or the variable stimulus in the performed cross-modal magnitude production task). The analysis reveals a massive and systematic role-dependence of internal references. This leads to predicting small but systematic deviations from cross-modal commutativity, which are in line with the observed data. In analogy to a term coined in the context of Weber's law this phenomenon is referred to as near-miss to cross-modal commutativity. The presented theory offers a psychological rationale explaining this phenomenon, and opens up an innovative approach to studying cross-modal perception.

Keywords: cross-modal perception, magnitude production, global psychophysics, internal references
Presentation type: Oral presentation / Talk
Session: Numerical Cognition / Crossmodal Perception

Decision time directly influences confidence in dynamical confidence models

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Decision time is a crucial factor in the computation of confidence judgments during decision-making. We investigated the role of accumulation time in sequential sampling models of confidence, examining optimal confidence computation in a Bayesian observer model and fitting dynamical confidence models to empirical data.
The Bayesian analysis revealed that an optimal observer discounts the final available evidence by the accumulation time. In addition, if there is evidence about task difficulty, which is independent of the stimulus category, optimal confidence relies on this information as well. We introduce the dynamical visibility, time, and evidence model (dynaViTE), which captures the significance of accumulation time in confidence determination, and compared its performance with other sequential sampling models. DynaViTE outperformed alternative sequential sampling models of confidence, providing the best fit to observed data. This suggests that human observers effectively utilize decision time as a key factor in confidence computation.
While the study emphasizes the importance of accumulation time, it is still an open question, whether the precise calculations involved in this process in human decision-making adhere to Bayesian principles or follow heuristics. This uncertainty invites future research to unravel the intricate mechanisms behind how humans integrate decision time in the computation of confidence.

Keywords: confidence, computational modelling, drift diffusion model, response times, perceptual decision-making, metacognition
Presentation type: Oral presentation / Talk
Session: Decision Making II

The Perils of Being Busy: A Closer Look at Working Memory Capacity and Clock Checking Behaviors in Time-Based Prospective Memory

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This study explores the relationship between time-based prospective memory (TBPM) performance and individual differences in working memory capacity, specifically focusing on binding and updating capacities. A total of 132 participants performed three working memory tasks (binding, updating, and operation span) and eight 5-min blocks of a TBPM task. The latter comprised a word-picture matching task as ongoing task with TBPM instructions to press a special key every five minutes. Participants could check a screen clock to monitor the time at any time during the ongoing task. We examined clock-checking strategicness by evaluating the frequency of checks in the final quarter of each block relative to the total number of clock checks throughout the block. Generalized Linear Mixed Models results indicated that higher working memory composite scores and more strategic clock-checking predicted superior PM performance, with updating abilities playing a pivotal role. We also found higher ongoing task accuracies but no accelerated response times in participants with higher working memory composite scores. These results suggest that both general cognitive-capacity (mainly in terms of updating) and task-specific strategic processes are crucial for maintaining an intended action until the planned execution time. This study contributes new insights into the interplay between working memory components and TBPM.
Keywords: prospective memory, time-based, working memory, binding, updating, clock-checking
Presentation type: Poster Presentation
Session: Memory and Learning I

High-Performance Experiments in R with the Glia Package

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The R programming language is now widely used, and taught, for data processing in psychology and many social sciences. Despite its popularity and the widespread familiarity with R among students and researchers, when it comes to building experiments, both groups have had to pick up entirely new programming languages and skillsets. The glia package aims to remedy this, providing an accessible toolkit for constructing and running experiments from R. However, R was not originally designed to meet the demands of low-latency interaction and fast stimulus presentation that are fundamental to laboratory research. Therefore, we investigate whether, and how, it can be adapted, to combine a familiar and accessible programming language with the needs of scientists in terms of presentation latency and response timing accuracy. We demonstrate that the glia package can achieve high-fidelity timing from R, validate its performance with regard to stimulus presentation and response time measurement, and present a general pattern for building performant experiments in environments not built for this purpose.
Keywords: Experimental design, Software, R
Presentation type: Poster Presentation
Session: Methods

Exploring the Influence of Dual-Tasks on Auditory-Verbal Memory Encoding

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The relationship between attention and memory has been studied for a long time. Usually, dual-tasks at the memory encoding stage decrease recall performance for the studied information and impair concurrent task performance. Yet, which cognitive mechanisms are underlying this dual-task interference is still an unresolved question. Hence, we investigated the influence of a concurrent task on the encoding process of auditory information. Participants were asked to perform an auditory-verbal free recall memory task and a visual-manual spatial Stroop task in single or dual-task conditions at the encoding stage of the memory task. The temporal overlap of the stimulus presentation of both tasks was varied (i.e., different stimulus-onset asynchrony). Further, a possible relationship between memory encoding processes and response selection processes in trials with a processing conflict (i.e., incongruent trials) in the concurrent task was analyzed on a trial-level. Results showed detrimental effects on memory accuracy and concurrent task performance in the dual-task condition compared to the single-task condition. Effects of varying temporal overlap and the influence of processing conflicts in the concurrent task on memory encoding processes are further discussed.
Keywords: Memory, Attention, Dual-task, Encoding, SOA
Presentation type: Poster Presentation
Session: Memory and Learning III

How pointing gestures inform visual search

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People often point to refer to distal objects. In such situations, an observer of the gesture needs to search the vicinity of the pointed-at position for a matching object. We tested the hypothesis that observers encode the uncertainty associated with the perception of a pointing gesture to constrain the area in which they search for the target to a metrically defined region. Consequently, we predicted, that the density of the search display affects response times, but not the size of the fixated area. In a series of three VR experiments, participants were asked to search for a target shape, at which a virtual person pointed. In Experiment 1, the target was always present, faithfully indicated by the pointer, and the predictions were mostly confirmed. In Experiments 2 and 3, unbeknownst to our participants, the target was sometimes absent, but participants were allowed to cancel the search (Experiment 2) or indicate that the pointer was not pointing at the target (Experiment 3). In the target absent trials of these experiments, the size of the searched area was smaller when the search display was denser. The experiments reveal three important aspects about how pointing informs visual search. First, pointing guides attention to specific locations on a search display. Second, pointing constrains visual search to a subset of the search display. Third, the size of this subset does not directly correspond to any uncertainty that may have been associated with the pointing gesture.
Keywords: Pointing, Gesture, Visual Search, Uncertainty, Communication
Presentation type: Poster Presentation
Session: Attention

Exploring Interpersonal Dynamics: An Agent-Based Approach to Modeling Narcissism within a Social Context

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Besides intrapersonal psychological factors, interpersonal psychological factors are crucial for the development of mental health problems. Investigating the causal factors of these problems is difficult due to their limited manipulability in experimental settings. To address this problem, we propose to employ agent-based modeling (ABM), a cognitive modeling method used in various research fields. Our study aims to explore the dynamics of trait narcissism within a social context. We developed a model based on empirical findings for the underlying factors of grandiose narcissism as personality trait. Entitlement and the associated desire for popularity form the core of narcissism in the model. Narcissists employ two strategies, narcissistic admiration and rivalry, to achieve their goal. While effective in emergent or short-term situations, these strategies prove less efficient in enduring relationships. Because of the natural shift of emerging contacts to enduring relationships, once adaptive behavior becomes maladaptive, prompting narcissists to seek short-term situations by adjusting their social environment. By implementing the model as ABM, we examine the characteristics that are crucial for the development of grandiose narcissism, specifically emphasizing the role of social interactions. To validate our findings, we analyze the simulated data using social network analysis (SNA) and compare it with real-world SNA results. This exploration of underlying factors aims to discuss potential interventions that can be tested using ABM. Our approach demonstrates the applicability of ABM in psychological research, especially in studying both intrapersonal and interpersonal factors contributing to mental health problems.

Keywords: Narcissism, Agent-Based Modeling, Computational Modeling, Social Context, Social Network Analysis
Presentation type: Poster Presentation
Session: Interaction and Social Psychology

Grey Matter Matters: Cognitive Stability and Flexibility in Schizophrenia Spectrum Disorder

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Cognitive dysfunction constitutes a core characteristic of schizophrenia spectrum disorders (SZ). Specifically, deficits in updating generative models (i.e., cognitive flexibility) and ignoring distracters (i.e., cognitive stability) are considered critical contributors to cognitive impairment in these patients. Here, we examined the structural integrity of frontostriatal networks and their associations with reduced cognitive stability and flexibility in SZ patients. In a sample of 21 patients diagnosed with SZ and 22 healthy controls, we measured grey matter volume (GMV) using structural MRI. Further, cognitive stability and flexibility were assessed using a switch-drift paradigm, quantifying the successful ignoring of distracters and detection of rule switches. Compared to controls, patients showed significantly smaller GMV in the whole brain and three predefined regions of interest: the medial prefrontal cortex (mPFC), inferior frontal gyrus (IFG), and caudate nucleus (CN). Notably, GMV in these areas positively correlated with correct rule-switch detection but not with ignoring rule-compatible drifts. Further, the volumetric differences between SZ patients and controls were statistically explainable by considering the behavioral performance in the switch-drift task. Our results indicate that morphological abnormalities in frontostriatal networks are associated with deficient flexibility in SZ patients and highlight the necessity of minimizing neurodevelopmental and progressive brain atrophy in this population.

Keywords: schizophrenia; cognitive stability and flexibility; grey matter volume; frontostriatal networks; prediction errors
Presentation type: Oral presentation / Talk
Session: Clinical Psychology

Determinants of Source-Credibility Effects in the Continued Influence of Information

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Information presented by one source often has a continued influence on judgments even after the information was retracted by another source (*Continued Influence Effect*; CIE). According to the *model-updating account*, the CIE occurs because the original information is integrated into a situation model, but this model is not updated after retraction. Hey et al. (under review) found that the credibility of the sources of original information and retraction antagonistically affected the CIE. The model-updating account predicts such source-credibility effects on the CIE only if source credibility is available during situation-model integration at encoding, but not if it becomes available only after integration is completed. To test this, we had 432 participants read a fictitious news report in which original information and retraction were presented by sources that had either high or low credibility. Source credibility was either disclosed before presentation of original information and retraction (*before* groups) or thereafter (*after* groups). As predicted by the model-updating account, the timing of source-credibility disclosure moderated the source-credibility effects on the CIE: In the before groups, higher credibility of the source presenting the original information led to a larger CIE, and higher credibility of the source presenting the retraction led to a weaker CIE. In the after groups, in which source credibility presumably could not affect the situation model, there were no source-credibility effects on the CIE. Thus, source-credibility effects on the CIE are contingent on situation-model integration, which supports the model-updating account.

Keywords: Continued Influence Effect, model-updating account, source monitoring, source credibility, memory
Presentation type: Oral presentation / Talk
Session: Source Memory

To Play or not to Play? The Role of Video Gaming, (Media) Multitasking and Working Memory in Military Performance

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Military operations require multitasking. For instance, pilots must monitor control displays in addition to steering an aircraft. Moreover, foot soldiers must communicate and collaborate with comrades while performing reconnaissance missions. Whether this requires similar or distinct cognitive abilities is controversial. We found that officer cadets' performance in the multi-attribute task battery (MATB), a compound of four tasks to simulate a flight mission, moderately predicted how proficiently they shot at ring targets while additionally solving math problems and memorizing radio signals. This suggested that individuals may possess a common multitasking ability. We aimed to replicate this finding, and to investigate its constraints. We were particularly interested in the role of cognitive control functions, such as working memory capacity, and their interactions with media usage in this regard. This was because, a convincing body of research suggests that individuals' multitasking performance may be determined by working memory capacity; and this, in turn, may be enhanced by means of video gaming. But too much media usage, such as media multitasking, may cause the opposite effect. To address this, we recruited officer cadets to undergo cognitive assessment and to perform a simulated mission again. Preliminary results of this ongoing study indicate there may be interactions between cognitive control functions, media, and multitasking. However, these effects are inconsistent across multitasking assessments. Moreover, we were not able to replicate our previous finding yet. This is probably related to the yet small sample size of 18 participants. We plan on recruiting at least 12 additional subjects.
Keywords: cognitive control, Bayesian statistics, performance assessment, applied psychology
Presentation type: Oral presentation / Talk
Session: Rationalizing on the Constraints and Structure of Cognitive Control – Lessons from Laboratory and Field Assessments

Sequential adjustments of cognitive control in dual-task contexts

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To examine sequential adjustments of dual-task performance, we re-analyzed the data of four published task-pair switching experiments. In task-pair switching experiments, three tasks (e.g., A, B, C) are combined in two task-pairs (e.g., task-pair 1: A as Task 1 [T1] and C as Task 2 [T2]; task-pair 2: B as T1 and C as T2). Switching between task-pairs typically results in task-pair switch costs (i.e., worse performance in task-pair switch trials than in task-pair repetition trials). These performance costs indicate that the identity of the two component tasks performed in a dual task is jointly represented in a single mental representation, termed task-pair set. The data re-analysis revealed that task-pair switch costs were reduced after a task-pair switch relative to after a task-pair repetition. To explain this sequential modulation of task-pair switch costs by the task-pair sequence in the previous trial, we refer to top-down cognitive control theories and bottom-up automatic priming theories.
Keywords: multitasking, dual tasks, cognitive control, dual-task coordination
Presentation type: Oral presentation / Talk
Session: Multitasking and Cognitive Control II

Sampling Strategies and the Structure of Choice Problems

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In many choice situations in real life, we are initially uncertain about the properties of choice options, such as the possible outcomes and their probabilities. Making a decision then not only requires a procedure for comparing the options, but also a procedure for searching for information and stopping search. We develop a formal framework for specifying sampling strategies in terms of a search rule, a comparison rule, and a stopping rule to study how these three building blocks together shape risky choice. In a series of simulations, we demonstrate how different combinations of the building blocks and in particular their interaction give rise to qualitatively different cognitive processing mechanisms and systematically different choice patterns. For instance, we show how the same variations in the search rule can lead to diametrically opposed effects on reward maximization, depending on the comparison rule. Moreover, in line with previous research showing that cognitive strategies often interact with the task environment, we show how the behavior that a particular sampling strategy gives rise to also critically depends on the structure of the choice problems. Finally, underscoring the idea of bounded rationality and the merit of its cognitive-ecological perspective, we demonstrate how different sampling strategies can be used to balance the expected reward in a given environment against the efforts spend on sampling and computation to obtain this reward.
Keywords: risky choice, sampling, cognitive processes, choice ecology, bounded rationality
Presentation type: Poster Presentation
Session: Decision Making

How Are Mental Rotation Ability and Postural Stability Related?

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The three studies aim to comprehend the relationship between mental rotation and postural stability, with a specific focus on investigating the roles of two potential influencing factors: working memory and embodiment. These questions are addressed in two dual-task and one single-task experiment via classical frequentist, hierarchical, and Bayesian statistical approaches in healthy young adults. Overall, the results show that mental rotation interferes with postural stability when conducted simultaneously but is only weakly correlated when conducted in a single-task experiment. The dual-task experiments show higher postural sway for higher rotation angles in mental rotation tasks, a more stable stance during embodied than during non-embodied mental rotation tasks, and reaction time as a predictor of postural stability. The influence of different types of embodied stimulus material in mental rotation tasks on postural stability has yet to be clarified. Working memory seems to be no explanatory factor in the relationship between mental rotation ability and postural stability. This work shows how mental rotation ability and postural stability are related, emphasizes the role of embodiment, and gives directions for further research. When better understood, mental rotation training might be an interesting tool for rehabilitating patients with impaired postural control.
Keywords: Mental Rotation, Postural Stability, Interference, Dual-Task, Embodiment
Presentation type: Oral presentation / Talk
Session: Embodied Cognition

Cross-cultural differences in visual object and background processing in the infant brain

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Human visual cognition differs profoundly between cultures. A key finding is that visual processing is tuned towards focal elements of a visual scene in Western cultures (US and Europe) and towards the background in Eastern cultures (Asia). While some evidence for cultural differences exists for young children, to date, the ontogenetic origins of cultural differences in human visual cognition have not been unveiled. This study explores early cross-cultural differences in human visual processing, by tracking the neural signatures for object versus background elements of a visual scene in the electroencephalogram (EEG) of 12-month-olds, in Vienna (Austria; a Western culture; n = 35) and Kyoto (Japan; an Eastern culture; n = 36). Specifically, we separated neural signatures by presenting object and background at different stimulation frequencies (5.67 and 8.5 Hz). Results show that human visual processing is different between cultures from early on. We found that infants from Vienna showed a higher object signal, in contrast to infants from Kyoto, who showed an accentuated background signal. This early emergence of cultural differences in human vision may be explained in part by early social experiences: In a separate interaction phase, mothers from Vienna pointed out object (versus background) elements more often than mothers from Kyoto. To conclude, with a cross-cultural developmental neuroscience approach, we reveal that cross-cultural differences in visual processing of object and background are already present in the first year after birth, which is much earlier than previously thought.

Keywords: visual system development, infant cognition, frequency tagging, cross-cultural comparison, social learning
Presentation type: Oral presentation / Talk
Session: Cognitive and Neural Processes Underlying the Perception of Actions, Scenes and Objects I

Who Gave You This Bad Advice? A Multinomial Processing Tree Modeling Approach to the Role of Source Memory in Advice Taking

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In the typical advice-taking paradigm, a judge receives one or more pieces of advice and is then invited to make a final judgment based on the just presented advice. Under these conditions, people are sensitive to advice quality (e.g., Meshi et al., 2012). However, people often sample several pieces of advice from different advisors at different points in time. This research investigates the role of memory in delayed advice taking. Our prediction is that source memory moderates the influence of expertise on advice weighting. In Experiment 1 (N = 495), participants receive 48 pieces of advice for 24 different topics concerning the job as a doctor. Two pieces of advice about one topic are presented sequentially in one trial. In each trial, one piece of advice is provided by a doctor (i.e., an expert) and one is provided by a lawyer (i.e., a layperson). After advice presentation, participants provide their own judgment estimates and complete a source monitoring task in which they indicate the source of advice (doctor, lawyer, new). In a between-subjects design, participants either complete the judgment and source monitoring tasks immediately after advice presentation (after six trials in four blocks) or delayed (after having received all 48 pieces of advice). Combining multinomial processing tree modeling to measure source memory (Bayen et al., 1996) using a hierarchical latent-trait modeling approach and mixed effects regression weights of advice (Rebholz et al., 2023), we investigate the influence of item and source memory on expert and lay advice weighting.

Keywords:
Presentation type: Oral presentation / Talk
Session: Source Memory

The Relevance of Working Memory, Attentional Concentration and Behavioural Markers in ADHD Diagnostics

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Attention Deficit Hyperactivity Disorder (ADHD) is characterised by inattention, hyperactivity and impulsivity. Working memory correlates with inattention, but the theoretical background is unclear as to whether complex or only verbal working memory alone is an indicator. The first aim was to clarify this aspect. Pharmacotherapy reduces the symptoms of ADHD, but in practice we find, that parents often refuse it. The second aim was to highlight the differences between attentional concentration performance and behavioural symptoms in the light of pharmacotherapy. A battery of tests was used as a research tool. Verbal working memory was measured with the Non-Word Repetition Test and the Digit Span Test, complex working memory with the Listening Span Test and the Reverse Digit Span Test, attentional concentration with the d2-R Test and parents provided us with data using the Conner's Parent Rating Scale. The data were collected from 71 children with ADHD, aged 9-14 years, and they were analysed using a correlation matrix, t-test and linear regression. Scores on verbal and complex working memory tasks were correlated, and verbal working memory scores predicted complex working memory performance. The results also showed that children with ADHD whose parents refused recommended medication had significantly lower attentional performance. Although there were differences in performance, the parents' comments did not indicate this. The results help to specify the diagnostic toolkit of ADHD, support the performance disadvantages of refusing recommended medication, and highlight that parents' inability to objectively assess their child's performance may lead to negative attitudes towards accepting help.

Keywords: ADHD, working memory, pharmacotherapy, attention concentration, parent rating scale
Presentation type: Oral presentation / Talk
Session: Clinical Psychology

Prior Experience of Variability Influences Generalization of Unspecified Categories

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Category variability or diversity is an important factor influencing generalization. However, expectations of category variability may not only depend on the variability of encountered category members but may also be shaped by prior experiences with similar categories. In this study, we investigated whether we could influence category generalization by inducing different category representations in an "A, Non-A" categorization task: Participants either learned about a homogeneous category Non-A or a diverse category Non-A during a priming phase. In order to better understand the transfer process, we varied the nature of the learning phase from implicit transfer to explicit instructions that actively requested that participants use their prior experiences. We found that while with a homogeneous Non-A representation, generalization of the A and Non-A categories was equal, the generalization of category Non-A widened after a priming phase with a diverse representation. In a second experiment, we found that the widening of generalization of category Non-A occurred when the exemplars in this category were themselves diverse (feature-diverse condition) but not when the category contained distinct exemplars (exemplar-diverse condition). These results suggests that categorization is influenced by previous categorization experiences possibly altering the representation of a category. Further, the study gives a hint what kind of heterogeneity is needed to observe the commonly reported broader generalization of diverse categories. The finding has implications not only to understand the influence of prior experiences on category learning, but any cognitive process that hinges on generalization.

Keywords: Categorization, Variability, Prior experience, Generalization
Presentation type: Poster Presentation
Session: Memory and Learning I

An empirical study of the beauty of different types of spirals

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Spirals, a ubiquitous phenomenon in both nature and culture, have been crafted by humans as far back as 11,000 BC and have independently emerged in various locations. Their significance extends beyond mathematics and natural sciences, serving as popular motifs in art and design. Over time, a multitude of spiral types have been identified or invented, each with its unique aesthetic appeal. Despite the frequent assertion of their variation in beauty, empirical evidence to support such claims has been lacking. To address this gap, we conducted a study using various spirals - Archimedean, general Archimedean, logarithmic, golden, and Fibonacci - as stimuli in an online study. Each spiral type was represented in multiple versions, differing in size and number of loops. Participants were asked to rate the beauty of these spirals. The results revealed substantial differences in beauty among the spirals. Intriguingly, we identified two distinct groups of participants with contrasting preferences: one group favored Archimedean spirals and disliked logarithmic ones, while the preferences of the other group were reversed. Upon further analysis, we found that among the potential characteristics of the spirals - size, arc length, number of loops, and curvature - it was the arc length that was most influential in explaining the differences in preference.
Keywords: Empirical Aesthetics, Spirals, Beauty
Presentation type: Oral presentation / Talk
Session: Experimental Aesthetics II

Effects of subliminal brand priming on subsequent consumer choice? A failure to replicate

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Data fabrication has a long history in psychological research. One of the most (in)famous psychological “effects” is Vicary’s (1957) report of the ability to substantially bias consumer decisions via subliminal brand presentation (popcorn, cola) during cinematic projection. His fabricated results affected legislation in several states, and the effect continued to survive as a popular “urban legend” even nowadays. Most surprisingly, however, several studies in the last two decades reported actual empirical evidence in favor of Vicary’s claims, but with a twist: The effect was reported to hold only when you’re hungry/thirsty (i.e., in the presence of a corresponding need). We set out to replicate this effect. Experiment 1 (N = 230) involved an experimental between-subjects manipulation of thirstiness (low vs. high) and utilized a subliminal visual priming technique involving a commonly known beverage brand name vs. a comparable non-word. Interestingly, some aspects of the results suggested a potential effectiveness of subliminal brand name priming on subsequent beverage-related decision making. In Experiment 2 (N = 146), we intended to replicate this effect by implementing only the critical “high thirst” condition (while maximizing thirst potential). Here, no effect whatsoever of subliminal priming on product choice emerged. Overall, we conclude that our data do not support the notion of subliminal brand priming effects on consumer decisions.
Keywords: Subliminal priming, Consumer decision, Visual perception
Presentation type: Poster Presentation
Session: Perception I

Olfactory training

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The sense of smell is interrelated with psychosocial functioning. Olfactory disorders often decrease quality of life but treatment options for people with olfactory loss are limited. Additionally, olfactory loss accompanies and precedes psychiatric and neurodegenerative diseases. Regular, systematic exposure to a set of odors, i.e., olfactory training (OT) has been offered for rehabilitation of the sense of smell in clinical practice. As signals from the olfactory bulb are directly projected to the limbic system it has been also debated whether OT might benefit psychological functioning, i.e., mitigate cognitive deterioration or improve emotional processing. This presentation will bring together key findings on OT utility in the clinical practice and highlight the molecular, cellular, and neuroanatomical changes accompanying olfactory recovery in people with smell loss as well as in healthy people and experimental animal models. OT and its modifications will be discussed in terms ofn the interventions aiming to support cognitive functions and improve well-being.
Keywords: Olfaction, smell, exposure, depression
Presentation type: Oral presentation / Talk
Session: Cognitive and Neural Processes Underlying the Perception of Odors

Effects Of Cognitive Load And Directed Forgetting on Pavlovian-To-Instrumental Transfer.

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In Pavlovian-to-instrumental transfer (PIT), specific stimuli that predict particular outcomes can trigger instrumental responses associated with those outcomes. In this research project, we tested whether an outcome-specific PIT effect can be observed in minimal conditions where the link between Pavlovian cues and instrumental responses is disrupted using cognitive load and directed forgetting manipulations. In total, participants are randomly assigned to three different conditions: (1) a computer crash condition with cognitive load; (2) a computer crash condition without cognitive load; and (3) a no computer crash condition with cognitive load. We trained participants to learn different cue and outcome pairs in the first (Pavlovian) phase and then instructed one group to forget the cue-outcome pairs due to a fake computer crash. In the second phase, we presented them with the cues and asked them to perform the actions with or without cognitive load. Previous results have shown outcome-specific PIT effects in the crash conditions compared to the standard task with no crash. We expect to replicate a significant PIT effect in this study, and we also expect that the PIT effect in the crash condition with cognitive load will be significant. While we have no specific predictions for the cognitive load manipulation (comparison of Condition 1 with Condition 2), it could either increase or decrease the magnitude of the PIT effect.
Keywords: Pavlovian-to-instrumental transfer, cognitive load, directed forgetting, outcome-specific effect
Presentation type: Poster Presentation
Session: Memory and Learning II

On the "How" of Control in Evaluative Conditioning: Strategies and Representations

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People normally change their attitudes towards stimuli in line with the valence of spatio-temporally co-occurring other stimuli; a phenomenon termed the evaluative conditioning effect. However, this attitude change is far from always valid, endorsed by, or in the best interest of the person as such effects are present in many circumstances (e.g., advertising, persuasion, etc.) where one might wish to prevent or reverse this influence. We investigate for the first time how people control the effects of evaluative conditioning by assessing the contents of the acquired representations. We distinguish between two general types of representations which are closely linked to two strategies of exerting control. We posit that people can either integrate or add the validity information to stored stimulus valence representations. Several indicators of these representations are derived from evaluative ratings, memory measures, and process dissociation parameters, and cross-validated in a set of three experiments. Additionally, the present research identifies a moderator of the control strategies that people use and the resulting representations. Specifically, we posit and find that people can integrate validity information into the stored valence representations mostly when they attempt to control the evaluative conditioning effect at the time of exposure to the evaluative information. Control attempts taking place later are more likely to add than to integrate the validity information. Our findings have implications for theories of evaluative conditioning, for the methodological approach to the study of controllable and uncontrollable processes, as well as for the protection from unwanted or unethical influences on attitudes.

Keywords: controllability, representations, evaluative conditioning, attitudes, attitude acquisition
Presentation type: Oral presentation / Talk
Session: Current Developments in Evaluative Conditioning: Methodologies, Mechanisms, and Manifestations

Does Reward Induce Shifts in Learning-Guided Reactive Control?

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Multiple factors influence the optimization of cognitive control, such as the likelihood of conflict associated with specific items. To investigate learning-guided, reactive adjustments of control, the item-specific proportion congruence (ISPC) manipulation is commonly used in which PC is manipulated within a 50% congruent list comprising mostly incongruent (MI) and mostly congruent (MC) items. The ISPC effect, a smaller Stroop effect for MI items compared with MC items, suggests a more focused/relaxed control setting is retrieved for MI/MC items. We investigated how performance-contingent reward modulates item-specific control, presenting reward as a pre-cue and feedback (Experiment 1) or only as feedback following responses (Experiment 2). First, participants completed a reward-free baseline phase where ISPC was manipulated, which yielded an ISPC effect. Then in a subsequent test phase MC or MI items were associated with reward for different groups. It was expected that reward would reinforce the more focused control setting for MI items when they were reward-associated, but would negate the more relaxed control setting for MC items when they were reward-associated. In Experiment 1, the ISPC effect persisted when rewards were associated with MI items, but disappeared when rewards were linked to MC items. In Experiment 2, however, preliminary results showed a persistent ISPC effect for both groups. While reward shifted reactive control and modulated the ISPC effect when presented in advance of the stimulus, it did not induce a shift in reactive control when only presented as feedback. This highlights the nuanced interplay between reward-based mechanisms and reactive control.

Keywords: cognitive control, Stroop effect, item-specific proportion congruence, performance-contingent reward, flexible behavior
Presentation type: Poster Presentation
Session: Cognitive Control and Conflict I

Bridging the Gap Between Metamemory and Attitude Formation: Judgments of Learning Predict Evaluative Conditioning Effects Above and Beyond Memory

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Evaluative Conditioning (EC), the change in liking towards a neutral stimulus due to its pairing with a positive/negative unconditioned stimulus, is a central effect in attitude formation. Current research emphasizes the role of explicit memory in EC. However, human memory is no passive information-storage device, but people actively monitor and control their own memory processes. In the present research, we examined whether people can monitor their memory processes in attitude formation via EC and let participants predict whether they will remember the stimulus pairings in the future (judgments of learning, JOLs). In six preregistered experiments, higher JOLs were associated with stronger EC effects. Surprisingly, objective memory explained this effect only partially, although people's JOLs were moderately accurate in predicting memory performance. Following a Brunswikian perspective, we identified several variables contributing to the correlation between JOLs and the EC effect, such as the extremity of the unconditioned stimuli, the fit between conditioned and unconditioned stimuli, and the feeling of processing ease, which all correlated with higher JOLs and stronger EC effects. Further experiments showed the robustness of these effects across different boundary conditions, such as whether judgments and memory tests target the valence or the identity of the stimuli. Our results attest to the role of metamemory in attitude formation via EC, whereby expecting that one will remember a stimulus predicts the size of the EC effect over and above actual memory. By integrating two previously unrelated research areas, our studies provide important theoretical insights into both attitude formation and metamemory.

Keywords: evaluative conditioning, attitudes, memory, judgments of learning, metamemory
Presentation type: Oral presentation / Talk
Session: Current Developments in Evaluative Conditioning: Methodologies, Mechanisms, and Manifestations

Modeling Quantitative Judgments of Realistic Stimuli

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Almost all studies investigating the cognitive processes underlying peoples' judgments and estimates rely on simple artificial stimuli with predefined cue structures. One reason for the use of these kinds of stimuli is that the cognitive models used in this area of research require that the cues and cue values are known. This limitation makes it difficult to apply the models to research questions with complex stimuli with an unknown cue structure. Drawing on early categorization research, in two studies we demonstrate how cues and cue values of complex stimuli can be extracted from pairwise similarity ratings with a multidimensional scaling analysis. These extracted cues can then be used in a state-of-the-art hierarchical Bayesian model of quantitative judgments. Using this procedure, we replicate previous findings from multiple-cue judgment literature but use complex stimuli with an a priori unknown cue structure to demonstrate that MDS-based attributes can be used as cues in a cognitive model of numerical judgments.

Keywords: judgment, multidimensional scaling, cognitive modeling
Presentation type: Oral presentation / Talk
Session: Computational modeling in experimental psychology: Linking model-based and processtracing analyses

The Effect of Psychosocial Stress on Functional Connectivity and Neuroendocrine Markers in Children and Adolescents with Depressive and Anxiety Disorders

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The aim of this study is to investigate the effects of psychosocial stress on functional connectivity in relation to neuroendocrine markers in children and adolescents with depressive and comorbid anxiety disorders. The study will include 90 participants (n = 30 in each group) aged 11-19 years, divided into three groups: one group of patients with depressive disorder, another group of patients with depressive disorder and comorbid anxiety disorder, and a healthy control group. During the first appointment, participants will undergo a structured clinical examination and psychometric procedures. The second appointment will involve magnetic resonance imaging (MRI) scans to assess resting state functional connectivity before and after stress induction. Additionally, diffusion-weighted recordings (DTI) will be collected. Psychosocial stress will be induced using the established paradigm Montreal Imaging Stress Task (MIST), which requires participants to solve arithmetic tasks under social and time pressure. To assess brain activity during stress induction, task-based functional MRI scans will be conducted during both the control and experimental conditions of the MIST. Saliva samples will be collected from participants at various time points to analyze the hormones oxytocin (OXT) and cortisol (CORT). Differences in functional connectivity of fronto-limbic networks between all groups at rest are expected as well as changes in functional connectivity after stress induction associated with the release of OXT and CORT. Furthermore, psychometric procedures will provide insights into possible influencing factors. Overall, the study results aim to contribute to improved diagnostics and personalized treatment, providing valuable information for optimized treatment approaches.

Keywords: Functional connectivity, Psychosocial stress, Neuroimaging, Oxytocin, Anxiety, Depression, Children and Adolescents
Presentation type: No-Data Poster
Session: Clinical and Biological Psychology

Therapist vs AI: The ultimate battle for your mental health - and the winner is...
A discrete choice experiment into preferences for mental health treatments.

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Mental health problems have a considerable impact on individual well-being and healthcare systems. Past research has revealed gender-differences in both the prevalence of mental disorders as well as preferences for mental health treatment options. However, very little is known about gender-specific preferences for AI-driven mental health apps. This study aims to elucidate gender differences in preferences using a choice-based conjoint analysis (CBCA) in a nationally representative sample of 2.108 participants (53% female), aged 18 to 74 living in Germany. The CBCA task consisted of 20 choice sets, each featuring three treatment variants characterized by the attributes provider (AI, psychotherapist), content (emotions, behavior, relaxation-techniques), costs (fully-covered , 120€ per month, 35€ per month) and waiting time (one hour, three days). In addition to examining differences in preferences based on gender, age and prior experiences with psychotherapy and mental health apps were examined based on a pre-registered analysis plan. Overall the results revealed that superficial criteria, like costs, rather than content had the strongest impact on decisions and participants consistently favored mental health treatments involving some level of human interaction rather than solely AI-based approaches. Furthermore, results revealed statistically significant but “small” differences between men and women. Women showed stronger preference for psychotherapist then men. These gender differences remained stable when controlling for age, previous experiences with psychotherapy and mental health apps. Despite group differences, the general aversion to AI-based therapies persists, highlighting the need for strategies to overcome this if these tools are to enhance mental health on a large scale.

Keywords: artificial intelligence; psychotherapist; mental health treatment; preferences; choice experiment; choice analysis
Presentation type: Poster Presentation
Session: Clinical and Biological Psychology

Time-space interferences in young versus older adults

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Large objects are perceived to last longer. This is one example for the interference of time and space in perception. While some studies find a symmetrical interference, others find an asymmetrical interference, with time judgements being more influenced by spatial properties than vice versa.
Time-space interferences are well documented in infants, children, and younger adults. Surprisingly, we do not know if and how these effects might change with increasing age.
To investigate this question, older (>60) and younger (<35) adults were presented with an either small vs. large room through a head-mounted display for a short vs. long duration. After presentation, participants were asked to either reproduce the room size or the duration that the room was presented for.
The cross-dimensional interference effects were quantified by the room size affecting the judgment of duration and, conversely, duration affecting the judgment of room size.
Our results show a bi-directional, symmetrical interference between space and time. The effect was the same for older and younger adults.
Our results point to time-space interferences persisting, but not increasing in healthy aging.
Keywords: aging, time perception, VR, space percepton
Presentation type: Oral presentation / Talk
Session: Virtual Reality and the Perception of Time

Sensitivity and Response Bias in Attributions to Gender Discrimination

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Attributions to discrimination are subjective judgments that involve attributing the cause for the unfair treatment of a person to that person's social group membership. Here, we use signal detection theory (SDT) as a framework to differentiate between people's sensitivity (i.e., their ability to differentiate between situations with and without cues to discrimination) and response bias (i.e., their relative tendency for attributing to discrimination) in such judgments. To enable the empirical application of SDT to attributions to discrimination, we introduce a new paradigm that is set in the context of pay raise decisions made by a committee in a fictional company. In the paradigm, participants are presented with a number of such decisions involving employees of different social groups (as indicated by a portrait picture and a name) and are asked to judge for every decision whether they suspect it to be biased. We present the results of an experiment using this paradigm in the context of gender discrimination where we examined the impact of the discrimination context on participants' response bias and sensitivity. Our results suggest that people's response bias in attributions to discrimination is influenced by decision outcomes and by their expectations about gender bias, whereas gender differences in sensitivity in our paradigm appeared independent of the discrimination context.
Keywords: Discrimination, Gender Bias, Signal Detection Theory, Prejudice
Presentation type: Oral presentation / Talk
Session: Social Psychology

Neurophysiological principles underlying predictive coding during dynamic perception-action integration

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A major concept in cognitive neuroscience is that brains are “prediction machines”. Yet, conceptual frameworks on how perception and action become integrated still lack the concept of predictability and it is unclear how neural processes may implement predictive coding during dynamic perception-action integration. We show that distinct neurophysiological mechanisms of nonlinearly directed connectivities in the theta and alpha band between cortical structures underlie these processes. The neural processes modulated depend on whether perceptual and motor codes are integrated (bound), or whether they are retrieved during actions. During the integration of perception and motor codes, especially theta band activity in the insular cortex and temporo-hippocampal structures is modulated by the predictability of upcoming information. Here, the insular cortex is guiding processes. For the retrieval of such integrated perception-action codes especially alpha band activity is important. Here directed top-down influence of alpha band activity from orbitofrontal structures on insular and temporo-hippocampal structures is key. Likely, these top-down effects reflect attentional shielding of retrieval processes operating in the same neuroanatomical structures previously involved in the integration of perceptual and motor codes. Through neurophysiology, the present study connects predictive coding mechanisms with frameworks specifying the dynamic integration of perception and action.

Keywords:
Presentation type: Poster Presentation
Session: Motor and Action Control

Interoception in adolescents with self-harming behavior: changes after emotion induction and mindfulness exercise

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Individuals with non-suicidal self-injury (NSSI) are known to have difficulties in regulating their emotions and NSSI often serves as a maladaptive strategy for affect regulation. The perception of one's emotions (and therefore emotion regulation) is believed to depend on interoception, the ability to reflect on one's own bodily and emotional states. Previous research has mostly focused on adults and the general state of interoception instead of interoception during a state of arousal, which is when individuals with NSSI report the most urge to self-injure.
The aim of the present study was to investigate the extent to which interoceptive perception changes in adolescents between 13 and 17 years of age with NSSI (n = 15) and without NSSI (n = 15) after emotional arousal. In addition, it was investigated whether a short mindfulness exercise influences interoceptive perception after emotional arousal. Interoception was instrumentalized as performance on the heartbeat tracking task (HBT) in addition to recommended control tasks to improve validity of the measure. Additionally, questionnaires on alexithymia and bodily perception were administered. The HBT was conducted before and after induction of emotional arousal, and following a brief mindfulness intervention. Emotional arousal was induced via viewing of emotional pictures. It was hypothesized that adolescents with NSSI show a reduction in interoceptive accuracy on the HBT after emotional arousal, compared to adolescents without NSSI. Furthermore, an improvement in interoceptive accuracy after a brief mindfulness intervention was expected for both groups. The final results will be presented and discussed at the symposium.
Keywords: children, adolescents, self-harm, interoception, mindfulness, arousal
Presentation type: Oral presentation / Talk
Session: Innovative methods for assessing emotion recognition, interoception and stress processing in children and adolescents

Predicting engagement in computer-supported collaborative learning groups using natural language processing

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Collaborative group engagement is a key factor of success in learning groups. This work explores the development of an innovative natural language processing method for predicting collaborative group engagement. To this end, we identified linguistic markers based on an established observation-based scheme for rating collaborative group engagement, such as, semantic similarity to task instructions, verbal mimicry, sentiment, and use of jargon. We evaluated the predictive power of the linguistic markers on the data of an observational study in which 38 learning groups were instructed to perform a collaborative learning task. Overall, the data consisted of 2588 expert ratings on collaborative group engagement. We relied on machine learning to the predict collaborative group engagement ratings using informative subsets of linguistic markers. The results showed above-baseline predictive accuracy for all four dimensions of collaborative group engagement. Moreover, the analysis of feature importance points to quantity of utterances, responsiveness and uniformity of participation as the most important markers for collaborative group engagement. By harnessing natural language processing, this work extends traditional qualitative analysis and delivers nuanced quantitative metrics suitable for capturing the complexity and dynamics of contemporary Computer Supported Collaborative Learning (CSCL) environments. Thereby, it contributes to the evolving landscape of CSCL research and demonstrates the potential of novel analytic techniques to support and enrich qualitative analysis in multiple domains.

Keywords: CSCL, NLP, quality of collaborative group engagement
Presentation type: Oral presentation / Talk
Session: Enhancing Learning and Memory

The development of receptive fields for numerosity perception in the human brain

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Ultra-high-field fMRI at 7 Tesla in adults revealed that hemodynamic responses to visually presented numerosity are topographically organized like receptive fields in several cortical areas (Harvey et al., 2013). It is currently unknown, however, whether receptive-field like responses can also be detected in developing brains. In this presentation, we will report the results of a series of 7 Tesla fMRI experiments conducted with adults and 10-12 year-old children in which we presented numerosity in visual and auditory format. Developmental differences are captured by comparing numerosity maps of adults and children at the individual and the group level. We will test the hypothesis that developing numerosity maps are smaller and more broadly tuned compared to adults. Moreover, we will explore potential links between numerosity tuning and behavioural maths test performance. Our work will advance our understanding of individual differences in numerical cognition including neurodevelopmental disorders like dyscalculia.
Keywords:
Presentation type: Oral presentation / Talk
Session: Advances in Developmental Cognitive Neuroscience

Semantic facilitation in blocked picture categorization: Some data and considerations regarding task selection

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Semantic context effects in picture naming and categorization tasks are central to the development and evaluation of current models of word production. When pictures are named in a semantically blocked context, response latencies are delayed. Belke (2013) found that when the naming task was replaced with a semantic categorization task (natural vs. manmade), response latencies were facilitated. From this pattern, she concluded that semantic interference in blocked picture naming has its locus at the lexical level but its origin at the preceding semantic level. However, other studies using the blocking procedure have failed to find facilitation in semantic categorization tasks (Damian et al., 2001; Riley et al., 2015), calling this conclusion into question. In three blocked picture naming and categorization experiments, we investigated different variables that might account for the discrepant results in semantic categorization. We used different semantic categorization tasks, different response modalities, different response set sizes, and different blocking procedures. Semantic facilitation was reliably found in naturalness categorization, but there was no semantic effect in natural size categorization. We discuss the implications of these findings for appropriate task selection.
Keywords: speech production, picture naming, semantic categorization, semantic context effects, semantic blocking
Presentation type: Poster Presentation
Session: Language

Termination of haptic exploratory behavior is affected by motor effort and task demands

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Haptic exploration, the process by which humans gather sensory information through physical contact with objects, is inherently active and adaptive. We hypothesized that humans optimize the duration of their explorations, and that this optimization is shaped by an interplay of valuation and predictive processes that also take aversive consequences into account, e.g. motor effort. Motor control literature demonstrates that energetic costs are central determinants of human behavior (Shadmer et al., 2016). To study this in the context of haptic exploration, we assessed exploration duration and performance in a two-alternative forced-choice spatial frequency discrimination task under varying conditions of task demands and motor effort. Task demands were manipulated by varying the discriminability of the virtual grating stimuli. Motor effort was manipulated by implementing forces counteracting the participants' movements while switching between stimuli. Participants were instructed to switch between stimuli after each single swipe movement. We observed that higher task demands lead to higher numbers of movements (= longer exploration duration), likely reflecting a compensatory mechanism that allows to attain a certain level of task performance. This effect though is reduced when motor effort is increased: while low and medium task demands yield similar numbers of movements regardless of the related motor effort, higher demands do not lead to more movements when motor effort is very high. We conclude that the extent to which increased task demands are compensated via the extension and exploitation of an exploration depends on the costs that the agent is being confronted with.

Keywords: haptic exploration, optimization, sensorimotor control
Presentation type: Oral presentation / Talk
Session: Touch perception: From Unisensory to Multimodal

The usefulness and precision of active manipulation of speed-accuracy trade-offs

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In cognitive experiments, participants are often instructed to respond as fast and as accurately as possible. As these are two conflicting goals, there is an individual choice of interpretation regarding a speed-accuracy trade-off, which can hinder the interpretation of isolated reaction time and accuracy scores, especially when they are suspected to be caused by different underlying mechanisms. Different calculations are employed to derive single measures from the combination of speed and accuracy. Although there exists theoretical foundation for some of these measures in the form of drift diffusion models, neither do the models perfectly map the true decision-making process nor do the combined measures perfectly capture all aspects of the models.
The idea to be presented here is to employ a single target score. This is known to participants, thus mitigating the conflict between two goals. The target score will be a sum of positive points for correct answers and negative points for incorrect answers and the goal will be to acquire as many points as possible in a given time frame. By changing how the points are distributed, participants should focus on either speed or accuracy. However, the single score introduces increased complexity by requiring participants to optimize their individual speed-accuracy trade-off according to the score. The goal is to investigate whether participants are able to adapt their speed and accuracy to optimize the scores thereby allowing the analysis of a single target measure.
Keywords: Speed-Accuracy Trade-Offs; Decision Making; Integrated Scoring; Task Instructions
Presentation type: No-Data Poster
Session: Methods

Do it again! – A paradigm and pilot study for the differentiation of habituation and adaptation on cybersickness susceptibility

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Experiencing virtual reality (VR) can cause discomfort ranging from headache to nausea, also called cybersickness. Evidence suggests that individual susceptibility to cybersickness is reduced by repeated exposure. However, the literature lacks a comprehensive differentiation of the potential working mechanisms which is why previous experience with VR leads to partially contradictive findings. To unravel the working mechanism behind the repeated exposure we developed a paradigm, that differentiates between habituation and adaptation. Thereby, we address the role of quality and stimulus intensity in reducing cybersickness. To separate habituation and adaptation the paradigm uses a repeated measures design (three sessions on two days) with the between-subjects factor of game order. While Group 1 plays a witch game and a knife-throwing game on the first day, Group 2 only plays the witch game. On the second day, the witch game is played the second time in both groups, but Group 2 additionally plays the knife-throwing game. Both games use controller locomotion, collecting tasks, and standing VR to achieve an ecologically valid setting.
For the efficacy of the paradigm and the functionality of the VR application, we conducted a pilot study (N = 6). The qualitative and quantitative results of the pilot study led to a positive evaluation of the approach and some improvements. To conclude, the developed paradigm serves as a basis for standardized research methods that address the question of the working mechanism behind the effect of repeated exposure. Systematically conducted future research can therefore assist the development of countermeasures against cybersickness.

Keywords: Virtual Reality, Cybersickness, Previous Experience, Paradigm, Adaptation, Habituation
Presentation type: Poster Presentation
Session: Cognitive Control and Conflict I

Cognition through the lens of behavior using Spatiotemporal Survival Analysis (StSA)

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Experimental control and minimalism are central concepts in experimental psychology. To preserve both, behavioral experiments are typically conducted on a computer display, using response times (RT) and accuracy of keypresses as measures of cognitive activity. Virtual Reality (VR) offers an ecologically valid yet controlled alternative, allowing stimulus presentation in an immersive 3D environment and spatiotemporal trajectory tracking of hand movements. We investigated the benefits of VR by comparing a classical experiment to its VR counterpart. Classical effects of working memory load on RT in an n-back task were reproduced in VR, in the Halfway and Arrival times of response trajectories. To understand the dynamics of this response behavior, we employed Survival Analyses. Our analysis showed overall consistency in temporal dynamics between classical RT and trajectory measures. This consistency cross-validates classical and VR results. Survival analysis on classical RT showed some surprising effects, namely a bias for sameness in early responses that is resolved in later ones. These observations led us to propose an innovative spatiotemporal survival analysis of response trajectories. The graphs produced by this method show not only when, but also where in the trajectories effects such as the early response bias arise. We conclude that while classical and VR-based results are mutually consistent, spatiotemporal survival analysis shows the latter to be more informative and capable of enhancing our understanding of response processes.
Keywords: mental chronometry, response trajectory, reaction times, accuracy, experimental psychology
Presentation type: Oral presentation / Talk
Session: Virtual Reality and the Perception of Time

Is implicit knowledge about repeating SOA sequences used to reduce between-task interference in dual tasks?

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Performing two tasks at the same time involves the risk of between-task interference, measured as the backward crosstalk effect (BCE). The BCE is larger the more simultaneous the tasks appear, i.e., with shorter stimulus-onset asynchronies (SOA). Fischer and Dreisbach (2015) found that stimuli associatively linked with short SOA facilitated task shielding of Task 1 (i.e., smaller BCE). Röttger et al. (2021) tested whether implicit knowledge about SOA sequences across several blocks would facilitate task shielding as well. Using a dual-task paradigm with spatial response overlap (manual-pedal left-right responses) they did not find differences in the BCE between blocks of fixed or random SOA sequences, however. In the present online study, we adapted the design of Röttger et al. (2021) and used a dual task with identical task sets to maximize dimensional overlap. A simplified sequence of six SOAs (short-short-medium-medium-long-long) was used for four blocks with a subsequent block of random SOA presentation. Results showed that the size of the BCE remained constant throughout the sequence blocks but increased for the random block, suggesting that implicit knowledge about SOA sequences was used for task shielding. These preliminary findings will be replicated in a second laboratory study that adds another sequential block after the random block.
Keywords: dual task, cognitive control, implicit sequence learning, bottom-up control
Presentation type: Oral presentation / Talk
Session: Multitasking and Cognitive Control II

Metacognitions in AI-augmented decision-making

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As artificial intelligence (AI) performs increasingly complex cognitive tasks, human decision-makers must closely collaborate with AI to monitor, interpret, evaluate, and refine its results (augmented decision-making). Augmented decision-making can place high metacognitive demands on human decision-makers, who must monitor and control not only their own cognitive processes but must also assess the accuracy of AI results and act upon these assessments. To understand the role of individuals' metacognitive ability in augmented decision-making, we will analyze data from a large-scale experiment on medical decision-making. In this experiment, N = 117 medical students and medical doctors made confidence judgments for 150 diagnoses based on CT scans in one unsupported trial without AI support and two AI-supported trials. After determining which measure of metacognitive accuracy is best suited for assessing decision-makers' metacognitive abilities, we will examine the association between metacognitive accuracy in unsupported trials and the decision-making performance in AI-augmented trials. We expect that high metacognitive competencies (1) positively predict performance in AI-augmented decision-making and (2) foster adaptive reliance on AI advice. This research will provide insights into the contributions of metacognition to successful AI-augmented decision-making.
Keywords: Artificial Intelligence, Metacognition, Human-AI collaboration, Decision-Making
Presentation type: Oral presentation / Talk
Session: AI and decision-making: Insights from varied applied settings

Who are the users of ChatGPT? Implications for the digital divide from web tracking data

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A major challenge of our time is reducing disparities in access to and effective use of digital technologies, with recent discussions highlighting the role of AI in exacerbating the digital divide. We examine user characteristics that predict usage of the AI-powered conversational agent ChatGPT. We combine web tracking and survey data of N=1068 German citizens to investigate differences in activity (usage, visits and duration on this http URL). We examine socio-demographics commonly associated with the digital divide and explore further socio-political attributes identified via stability selection in Lasso regressions. We confirm lower age and more education to affect ChatGPT usage, but not gender and income. We find full-time employment and more children to be barriers to ChatGPT activity. Rural residence, writing and social media activities, as well as more political knowledge, were positively associated with ChatGPT activity. Our research informs efforts to address digital disparities and promote digital literacy among underserved populations.
Keywords: onversational agents, ChatGPT, web tracking, inequalities, digital divide
Presentation type: Oral presentation / Talk
Session: Artificial Intelligence

Up- and downsides of control: explaining facilitatory and detrimental effects of sense of agency on goal-directed behaviour

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Humans can have a high or low feeling of control over their actions or their environment. But does this subjective sense of agency have a practical impact on our behaviour? Studies which investigated the impact of sense of agency on human performance came to inconsistent conclusions. While some found that sense of agency improved the ability to master cognitively demanding tasks, others found that high sense of agency was associated with lower task performance. Based on recent empirical work from our and other laboratories, we propose that these seemingly contradictory findings indicate dissociable mechanisms of agency-related influences. On the one hand, perceived controllability of the environment can enhance cognitive performance, since humans have a higher motivation to invest mental effort in tasks if they believe that the task outcome directly depends on their behaviour. On the other hand, humans often show an agency-related preference bias, meaning they automatically gravitate towards actions which they, rightly or wrongly, associate with a high degree of control. Such and agency-related bias can lead to irrational or suboptimal behaviour, since humans might gravitate to a less beneficial behaviour simply because it is associated with a higher subjective feeling of control. We will discuss the factors that determine if sense of agency is more likely to be beneficial or detrimental to goal-directed performance. Determining how sense of agency can both support and undermine goal-directed behaviour will be crucial to understand the functional role of sense of agency for human cognition.

Keywords: sense of agency, cognitive control, action fluency, freedom of choice
Presentation type: Oral presentation / Talk
Session: Sense of agency in action: The influence of control experience on goal-directed behaviour

Scene perception, in the eye of the beholder

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The efficiency of visual perception is not solely determined by the structure of the visual input. It also depends on our expectations, derived from internal models of the world. Given individual differences in visual experience and brain architecture, it is likely that such internal models differ systematically across the population. Yet, we have no clear understanding of how such differences shape the individual nature of perception. Here, we present a novel approach that uses drawing to directly access the contents of internal models in individual participants. Participants were first asked to draw typical versions of different scene categories, taken as descriptors of their internal models. These drawings were converted into standardized 3d renders, which we used as stimuli in subsequent experiments. In a series of behavioral experiments, we show that participants more accurately categorize scene renders when they are more similar to their personal internal models. Using multivariate decoding on EEG data, we further demonstrate that similarity to internal models enhances the cortical representation of scenes, starting from perceptual processing at around 200ms. A deep neural network modelling analysis on the EEG data suggests that scenes that are more similar to participants' internal models are processed in more idiosyncratic ways, rendering representations less faithful to visual features. Together, our results demonstrate that differences in internal models determine the personal nature of perception and neural representation.

Keywords: Scene perception, individual differences, drawing, predictive processing, internal models, EEG, deep neural networks

Presentation type: Oral presentation / Talk

Session: Cognitive and Neural Processes Underlying the Perception of Actions, Scenes and Objects II

Sticking together – hierarchical relationships between objects in scenes are reflected in neural activation patterns across time

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The real world is rich in structure – clusters of objects frequently co-occur in scenes forming meaningful sub-units – phrases. Therein, larger stationary objects anchor predictions regarding smaller objects we tend to interact with. Do representations of individual objects contain such hierarchical information via shared representations between objects from the same phrase? If so, at what time and in which format during object processing do these emerge? In the present EEG study, we presented objects from four different phrases spanning two different scenes (kitchen and bathroom). We used multivariate pattern analysis (MVPA) in a cross-decoding framework to quantify shared representations between objects from the same phrase. We found phrase specific shared representations, even as the objects were presented in isolation, and more so when generalizing from anchor to local objects than reverse. Crucially, we did not find this generalization for objects from the same scene, but different phrases, providing evidence that the phrase sub-unit gives structure to representational spaces underlying fast and automatic object processing. To conclude, we provide evidence that the visual system represents a more fine-tuned hierarchical structure of object relationships which reflects object co-occurrence statistics in the real world during fast and automatic object processing than previously assumed. This has important implications not only regarding our understanding of core object representations but importantly it also furthers our understanding of the mechanisms behind hierarchical predictions as observed in efficient guidance of attention and (inter)actions across a range of real-world visual search tasks.

Keywords: structured representations, EEG, object processing, MVPA
Presentation type: Oral presentation / Talk
Session: Natural Scene Perception

Action anticipation in goal-directed grasping: An ERP study

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A well-known phenomenon of motor control is the end-state comfort effect, which describes the tendency to plan grasping actions in such a way that they end in a comfortable posture. However, insights into neural mechanisms underlying different sequences of goal-directed grasping are lacking. Sixteen right-handed participants were presented with different sequences of a bar-transport task by using a priming paradigm and were asked to judge the top color of the bar. Primes represented either comfortable (overhand grip; OH) or uncomfortable (underhand grip; UH) initial grasp postures, and targets depicted either comfortable (thumb up; TU) or uncomfortable (thumb down; TD) final postures of this grasping action. Different action sequences (OH-TU, OH-TD, UH-TU, UH-TD) were represented by the prime-target pairs reflecting either a physically possible or a physically impossible movement. Behaviorally, we found shorter reaction times to the OH-TU than to the OH-TD sequence ($p < .05$; Cohen's $d = 0.16$). Additionally, reaction times to the UH-TU sequence were shorter compared to the UH-TD sequence ($p < .05$; Cohen's $d = 0.15$). Neurophysiologically, the targets were found to evoke a fronto-central distributed P300 component with a significantly smaller amplitude in the UH-TU than in the UH-TD sequences ($p < .05$; Cohen's $d = 0.35$). Importantly, the effect was only found for the physically possible actions. Our findings, which are supported by behavioral and neurophysiological measures, are consistent with the end-state comfort effect. The results suggest the generation of expectancy violations by the incongruity in representing an action sequence (spatio-temporal order/physical possibility).

Keywords: grasping, end-state comfort effect, action anticipation, Priming, P3
Presentation type: Poster Presentation
Session: Motor and Action Control

Time in Flux: Examining the Mood-Driven Dynamics of Time Perception

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Ege University

Numerous studies have established that emotional stimuli exert a significant influence on perceived time. Furthermore, the current mood of the perceiver can independently impact perceived time, yet few studies have specifically explored how mood contributes to the perception of time. Particularly unclear is which features of moods contribute to the perception of time as either prolonged or shortened. Addressing this gap, our study delves into the influence of positive moods, specifically amusement and tenderness, as well as negative moods, fear and anger, on perceived time.
To induce specific moods, participants watched emotionally charged film excerpts, and subsequently, they engaged in a temporal bisection task to estimate the duration of a black circle on the screen. The results reveal that participants induced into fear and amusement moods tended to overestimate time compared to those in anger, tenderness, and neutral conditions. Despite the diverse valence dimensions of emotions, similar temporal distortions were observed. Additional analyses in the study suggest that the perception of extended time is associated with heightened arousal, motivational intensity, and uncertainty induced by emotions. These findings illustrate that mood contributes to temporal distortions in a multidimensional manner beyond the valence dimension of emotions.
Keywords: time perception, mood, temporal distortion, emotion
Presentation type: Poster Presentation
Session: Perception I

How women's affective responses to sexually arousing pictures are affected by their orgasm faking?

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Sexuality has physical, relational, and emotional components. Taking into consideration the limited number of studies about the emotional background of female sexuality, orgasm and especially orgasm faking, we focused on the analysis of categorial emotions associated with the sexual life in general and in specific picture evaluating situations. The aim of our research was to deepen the understanding of the emotions behind the complex course of faking orgasm during oral sex and sexual intercourse. To investigate these relationships women (N=200) completed our online survey including measures of faking orgasm (FOS) and the basic emotional level related to their sexuality in general. They were also asked to rate standardized images related to casual and erotic (oral and intercourse) events of heterosexual couples. Our results suggest that different categorial emotions can be matched with altering motives behind faking orgasm. However, faker and non-faker women's feelings about their sexuality were not significantly different, but as soon as they were presented with erotic visual stimuli significant differences were found. Thus, as it was expected, the visual material helped them recalling feelings. Furthermore, subsequent analysis revealed that some motivations behind female orgasm faking during receiving oral sex mediated the associations between their feelings about their sexuality and evaluation of sexually arousing pictures. Using this new approach, our research contributes to a better and deeper understanding of the phenomenon of female faking orgasm and the results have implications for professionals helping people with sexual problems and women who are uncertain about their feelings and sexuality.
Keywords: female faking orgasm, sexuality, emotions, affective responses, picture evaluation
Presentation type: Poster Presentation
Session: Clinical and Biological Psychology

Action effectiveness in motor cognition: The enhancing impact of an own-action effect on behavior and motor performance

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Over the past decade, research has increasingly supported the rewarding impact of an own-action perceptual effect by demonstrating its enhancing influence on behavior and motor performance. Critically, for a perceptual effect to impact behavior, it must be recognized as an own-action effect, either through a sensorimotor computational process at a pre-conceptual level or through a higher-level cognitive process involving causal attribution and control beliefs. In this talk, I will present findings demonstrating the impact of action-effect on various behavioral indices. I will propose potential mechanisms by which the action-effect enhances behavior and motor functions across several processing levels.
Keywords: action-effect, motivation, action-selection, motor performance, sensorimotor, delay
Presentation type: Oral presentation / Talk
Session: Sense of agency in action: The influence of control experience on goal-directed behaviour

The usage of implicit prior information in the haptic perception of softness

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Justus Liebig University Giessen

Active touch provides crucial information while performing daily tasks. Imagine choosing a fruit with a specific softness during shopping and how you indent it. It is known that humans tune their exploratory movements to gather the most relevant information. In this process, prior information can guide exploratory behaviour. In softness discrimination, e.g., people apply higher forces to harder (but not softer) objects when they expect to explore stimulus pairs from the same compliance category in a longer block (hard or soft only), and this improves performance. However, such implicit force tuning does not occur for shorter predictable sequences (alternating series of 2 pairs, Drewing & Zoeller, 2021). Here, we investigated when and how implicit prior information becomes accessible for exploratory control. Participants were presented with series of hard or soft stimulus pairs with lengths of 2, 4 or 6 pairs. In predictable blocks same length series of hard and soft pairs alternated. In unpredictable blocks, series lengths occurred in random order. In each trial participants indicated the softer stimulus. We analysed the initial indentation force, because effects here indicate the use of prior information before sensory information is available. Participants applied more force to harder, but not to softer stimuli when the conditions allowed to predict the occurrence of a longer sequence of 6 hard trials as compared to an unpredictable or short sequence. This suggests that people implicitly tune their forces in few trials to improve their softness perception when they can anticipate properties of the upcoming stimuli.

Keywords: haptic perception, softness, implicit, prior information, exploratory behaviour
Presentation type: Oral presentation / Talk
Session: Touch perception: From Unisensory to Multimodal

Whispered distraction: A comparison of irrelevant sound effects with loud and whispered speech in native and foreign language

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Task-irrelevant sound is known to disrupt short-term memory either by interfering with specific processes or through a diversion of attention. This study investigates the disruptive effect of whispered speech to test diverging predictions of these accounts. According to an interference-by-process account, whispered speech should be less disruptive, because the reduced temporal fine structure and lower amplitude modulations may provide weaker order cues to the auditory system, thus inducing less interference with seriation processes. In contrast, the attentional account predicts more disruption by whispered speech, due to the enhanced listening effort to process semantic information of whispered utterances (when presented in a comprehensible language), and because the contents of whispered speech may be considered potentially more important. In Experiment 1, participants were asked to remember visually presented letters while either loud or whispered speech was presented. The speech recordings consisted of either a single German word that was played repeatedly (steady-state) or full German sentences (changing-state). Recall accuracy was lower in the presence of changing-state speech, indicating interference-by-process. However, regardless of the state, whispered speech was found to be more disruptive than loud speech, thus indicating an additive effect of attentional capture. To test the listening-effort account, the same speech materials were presented to English participants who did not understand German (Experiment 2). While the changing-state effect was equivalent to Experiment 1, whispered speech was less disruptive than loud speech to the English sample, indicating that psychoacoustic properties may dominate when no additional listening effort is demanded by a foreign language.

Keywords: auditory distraction; irrelevant sound effect; whispering; listening effort
Presentation type: Poster Presentation
Session: Language

Practical exercises on sensation and perception: Come by and try it yourself

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Witten/Herdecke University

Would you like to try miracle berries that make everything taste different? Or take a look through upside-down goggles? Do you like to compete against other conference attendees in our smell quiz and win a cool prize? This is part one of a two-part poster, in which we present an article that was recently accepted for publication in the special issue of Visual Cognition about teaching sensation and perception. In the article, we describe practical exercises that cover all the classic topics in the curriculum (vision, hearing, smell, taste, and touch) and work best in small groups of up to ten students. They last between 5 and 45 min and range from short demonstrations on depth perception and sound source localization to more elaborate setups such as a double-blind taste test and an obstacle course with upside-down goggles. This is the interactive part where you can try out some of the activities for yourself. If you are also interested in the theoretical background, make sure to check out part two as well. We are looking forward to seeing you!
Keywords: teaching, open educational resources, sensation, perception
Presentation type: Poster Presentation
Session: Perception I

Cognitive and Neural Mechanisms of the Date/Delay Effect in Intertemporal Choice

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In intertemporal decision-making, temporal discounting describes the tendency to devalue future rewards as a function of time until receipt. Experimental studies have shown that temporal discounting can be influenced by task framing. For instance, temporal discounting is reduced when displaying delays in terms of dates rather than as delay units, an effect commonly referred to as date/delay effect. So far, however, the cognitive and neural mechanisms of the date/delay effect are largely unclear. Therefore, in this presentation I will present several studies on the date/delay effect. Findings reveal that the effect itself is highly replicable. Eye-tracking results show that the date condition was associated with more eye movements comparing and fixating time attributes. Moreover, one study suggested that absolute reward differences were more predictive of choosing future rewards in the date than in the delay condition. Finally, functional magnetic resonance imaging (fMRI) findings revealed higher activations of brain areas associated with episodic thinking (precuneus/posterior cingulate and angular gyrus) in the date compared to the delay condition. Interindividually, higher prefrontal activity was associated with a lower date/delay effect. Overall, the date/delay effect represents a robust framing effect in intertemporal choice. The date condition appears to trigger different time processing, resulting in higher perceived proximity of future rewards and, potentially, higher weighting of reward attributes. It is conceivable that the date/delay effect is particularly effective in more impulsive decision-makers.
Keywords:
Presentation type: Oral presentation / Talk
Session: Modulation of Impulsive Choice and Impulsive Action

Spatiotemporally organized high-frequency visual stimulation can induce SSVEP beyond retinal limitations.

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Flickering visual stimulation targeting the entire visual field can evoke steady-state visual evoked potentials (SSVEPs), and these SSVEPs can potentially influence ongoing brain activity. Here, we aimed at extending previous findings to evoke high-frequency SSVEPs. We hypothesized that sequentially targeting selected neighboring retinal areas allows evoking a high-frequency series of visual evoked potentials, which sum to a high-frequency SSVEP across the visual cortex. By selectively and sequentially targeting neighboring retinal areas with high-frequency flickering light, each area was only stimulated every 10ms, but neighboring areas were stimulated at a lag of 8.33ms, 6.06ms, 5.55ms, and 5.26ms (i.e., 120, 165, 180 and 190Hz), for 60 trials of 2s, while we recorded 64-channel EEG from 10 participants. In line with our hypothesis, we measured SSVEPs for 120Hz and 180Hz stimulation with an occipital topography. For the first time, we show that it is possible to evoke high-frequency SSVEPs as high as 180Hz across the visual cortex by using a spatially organized noninvasive visual brain stimulation. This critically extends previous findings on SSVEPs following full-field visual stimulation. Spatially organized noninvasive visual stimulation could potentially be used as a tool to influence high-frequency oscillations, which opens the possibility of targeted therapeutic interventions.

Keywords: SSVEP, EEG, visual stimulation, oscillation, flicker
Presentation type: Poster Presentation
Session: Methods

The AX-CPT Is Not the New Task to Measure Attentional Control: Challenges in Reliability and Validity

Niels Kempkens, Nicolas Rothen, Alodie Rey-Mermet
UniDistance Suisse

Attentional control is the ability to maintain a goal and goal-relevant information in the face of distraction. Recent research has shown a difficulty of establishing attentional control as a factor explaining shared variance across tasks. This difficulty may stem from two sources of diversity. First, there is diversity in the design of typical attentional-control tasks. Second, there is diversity in the attentional-control processes. For example, proactive control (i.e., goal maintenance) and reactive control (i.e., goal reactivation) have not yet been disentangled. Our goal was to control these sources of diversity by using one task, the AX-CPT, in which we measured proactive and reactive control separately. Thus, our participants (N = 421) were asked to press a target key if the letter A was followed by the letter X and a non-target key for all other letter sequences. In addition to letters, we used words, dots, pictures, and matrices as materials. For each material, we calculated several attentional-control indices: d' proactive (= d' context), d' reactive, proactive behavioral index (PBI), BX interference, and A-cue bias. Preliminary results indicated good reliability for two proactive indices (d' proactive, PBI) and one reactive index (d' reactive) across materials (splithalf rs > .65). In contrast to the predictions, structural equation modeling showed a high latent correlation between d' proactive and d' reactive (r = .86) and a weak latent correlation between PBI and d' proactive (r = .30). These results question the validity of the attentional-control indices assessed with the AX-CPT.

Keywords: attentional control, cognitive control, proactive, reactive, AX-CPT, structural equation modeling
Presentation type: Oral presentation / Talk
Session: Working Memory

Experiential grounding of abstract concepts: Processing of abstract mental state concepts engages brain regions involved in mentalizing, automatic speech, and lip movements

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Abstract concepts like mental state concepts lack a physical referent, which can be directly perceived. Classical theories therefore claim that abstract concepts require amodal representations detached from experiential brain systems. However, grounded cognition approaches suggest an involvement of modal experiential brain regions in the processing of abstract concepts. In the present functional magnetic resonance imaging study, we investigated the relation of the processing of abstract mental state concepts to modal experiential brain systems in a fine-grained fashion. Participants performed lexical decisions on abstract mental state as well as on verbal association concepts as control category. Experiential brain systems related to the processing of mental states, generating verbal associations, automatic speech as well as hand and lip movements were determined by corresponding localizer tasks. Processing of abstract mental state concepts neuroanatomically overlapped with activity patterns associated with processing of mental states, generating verbal associations, automatic speech and lip movements. Hence, mental state concepts activate the mentalizing brain network, complemented by perceptual-motor brain regions involved in simulation of visual or action features associated with social interactions, linguistic brain regions as well as face-motor brain regions recruited for articulation. The present results provide compelling evidence for the rich grounding of abstract mental state concepts in experiential brain systems related to mentalizing, verbal communication and mouth action.

Keywords: semantic memory, abstract concepts, grounded cognition, language, mental states
Presentation type: Oral presentation / Talk
Session: Language

Sensory attenuation of self-initiated tactile feedback is modulated by stimulus strength and temporal delay in a virtual reality environment

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Despite extensive research across different modalities, the precise mechanisms of sensory attenuation (SA) remain debated. Our study investigated the underlying mechanisms of SA in the tactile modality, specifically examining self-initiation and temporal predictions within a virtual reality (VR) environment. The VR setup allowed for precise control over sensory feedback in response to movement. Participants (N = 31) engaged in an active condition, moving their hands to elicit a touch. Importantly, visual perception was modified in VR, so that participants touched their rendered – but not physical – hands. The virtual touch triggered a test vibration (intensity: 0.2, 0.35, 0.5, 0.65, 0.8, in a.u.) on the Meta Quest 2 touch controllers. Participants compared the test vibration to a standard stimulus (intensity: 0.5). In the passive condition, vibrations were presented without movement and were preceded by a visual cue. Further, test vibrations appeared either immediately or after a variable onset delay (700 - 800ms). Our results revealed a shift in the point of subjective equality (PSE) – the point at which the test stimulus is perceived as equivalent in intensity to the standard stimulus – depending on whether the stimuli were self-initiated or externally generated. This attenuation effect was most pronounced when self-initiated vibrations were of higher intensity 0.65, 0.8) and occurred immediately after the movement. Our findings highlight the importance of self-initiation on sensory attenuation. Further, the results suggest adaptiveness in the perceived intensity of self-initiated sensory input, with attenuation effects modulated by contextual factors such as signal strength and temporality.

Keywords: Sensory Attenuation, Perception, Tactile Modality, Virtual Reality
Presentation type: Oral presentation / Talk
Session: Crossmodal Perception / Synesthesia

Math Anxiety in Boys and Girls: Is State Anxiety Really Different?

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Research has shown that females experience higher levels of math anxiety than males. However, Goetz et al. (2012) argued that gender disparities in math anxiety may be a consequence of gender stereotypes rather than actual differences in anxiety levels. Therefore, gender differences may be confined to trait measures which are influenced by stereotypes to a larger extent. In support of this view, Goetz et al. found a difference between girls and boys only on a trait measure, but not on a state measure of math anxiety. However, the levels of state anxiety in this study were low, and the lack of a gender difference may be due to a floor effect. We report two studies examining gender differences in 5th and 6th grade male and female students using both state and trait measures of math anxiety. State anxiety was measured before, during, and after a mental arithmetic test administered online (Study 1) or as a paper-and-pencil test (Study 2). To avoid floor effects, the arithmetic problems increased in difficulty across blocks of arithmetic problems, and the state anxiety scale was designed to capture even low levels of anxiety. In both studies, state anxiety was higher in girls than in boys, although absolute levels were low in both genders. Possible reasons for gender differences in math anxiety are discussed.

Keywords: math anxiety, gender differences, state anxiety, trait anxiety
Presentation type: Poster Presentation
Session: Clinical and Biological Psychology

Differences in Sensitivity to Social Information about Risky Activities in Younger and Older Adults

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While social information can influence people's decisions regarding participating in potentially risky activities, the strength of this influence varies widely. This study concerns how far characteristics of the person providing the information affect the weight others assign to this information. Specifically, assuming homophily as the driver of sensitivity to information suggests that younger and older adults are more influenced by information from recommenders of their age group than by information from recommenders of another age group. In an online experiment, we asked 19- to 35-year-olds and 65- to 85-year-olds about their willingness to engage in risky recreational (Experiment 1, $N = 147$) or financial (Experiment 2, $N = 145$) activities, once before and once after reading reports of positive and negative experiences. These reports were either provided by people of the participant's own or of the other age group. We found no evidence that people generally give more weight to information from peer recommenders. However, in the recreational domain age still mattered: older participants gave more weight to negative information from younger recommenders compared to older recommenders, and more weight to positive information from older recommenders compared to younger recommenders. No such differences were observed for young participants or in the financial domain. One possible explanation for this pattern is that participants use age stereotypes to assign subjective informativeness to the recommendations.

Keywords: risk-taking, decision-making, social information, aging, age stereotypes, homophily, advice-taking

Presentation type: Poster Presentation

Session: Decision Making

The connection between impaired ecological decision-making and OCD

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Within the context of obsessive-compulsive disorder (OCD), impaired decision-making has been referred to as an endophenotype bridging the clinical manifestation of OCD and its neurobiological origins. Previous evidence supports the notion that ambiguity plays a crucial role in driving differences in decision-making performance between individuals with OCD and healthy controls. Traditionally explored through the Iowa Gambling Task, a scenario where participants engage in a sequence of value-based decisions by drawing cards from four distinct decks, with the mean deck values learned throughout the trial.
Yet, real-life decision-making involves uncertainty about future prospects, prompting the dilemma of persisting with the current option or exploring potentially more advantageous, yet unknown, alternatives. We are therefore interested in how previous findings apply to a more realistic foraging decision-paradigm. In a previous experiment with a healthy sample, we identified deviations from ideal decision-making behavior as a function of subclinical presence of OCD-related symptoms, particularly in challenging environments.
Our investigation systematically manipulates environmental quality, option value, and the costs associated with maintaining or altering strategies. This approach aims to reveal factors contributing to potential impairments in OCD patients compared to healthy controls.
Our hypothesis posits that individuals with OCD will exhibit diminished sensitivity to the costs of persisting with current choices or exploring unknown options and display a bias toward exploiting familiar options, deviating from optimal decision models, particularly in challenging environments. This inquiry not only deepens our understanding of OCD's impact on decision-making but also provides a foundation for targeted interventions within this domain.
Keywords: decision-making, foraging, OCD, computational modelling
Presentation type: No-Data Poster
Session: Decision Making

Eliciting disgust increases, but sensitivity to disgust decreases visual search performance

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Disgust plays a prominent role in several specific phobias besides fear. The intensity (arousal) of the phobia-related content affects performance in visual search. We suggest that the disgust sensitivity of a person could work similarly. Our study aimed to investigate the role of disgust and arousal in the perception of threatening content. Participants (N=52) were exposed to threatening (with medium or high arousal) and neutral pictures as task-irrelevant distractors while performing a primary visual search task in two blocks. Participants were randomly assigned into two groups. Between the blocks, they either saw a neutral video (neutral group) or a video that elicited disgust (disgust group). During the visual search task participants had to find the numbers in a matrix of white squares of varying sizes, in ascending order from 1 to 35. We measured the time taken to find the first number (finding nr1), and the time taken to find the first ten numbers (search time). In an explorative manner, we also measured the disgust sensitivity of participants. Regarding finding Nr1, our results show that participants were slower for high-arousal compared to medium-arousal and neutral images. Further, exposure to disgusting content resulted in faster response times. However, individuals with higher (compared to those with lower) disgust sensitivity were slower after viewing the disgusting video. Regarding search time, the video manipulation had no effect. However, the performance of individuals with higher (compared to lower) disgust sensitivity decreased. In sum, our results suggest that disgust has an effect mainly through arousal.

Keywords: visual attention, blood-injury-injection, orienting, inhibition, perception, number matrix
Presentation type: Poster Presentation
Session: Attention

Abnormal frontal theta oscillations as an electrophysiological marker of cognitive deficits in schizophrenia

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Schizophrenia is characterized by diverse symptoms ranging from delusional beliefs and hallucinations to cognitive disorganization. Cognitive disorganization encompasses different cognitive domains like executive functioning or memory and, in turn, hinders remediation processes and interferes with daily life. Due to this relevance, the aim of our study was to quantify the cognitive deficits in patients suffering from schizophrenia (SZP) and link them to potential changes in the frontal midline theta power in the electroencephalogram (EEG), an electrophysiological index related to initiating executive control. Thirty-two SZP and thirty-two matched healthy controls (HC) performed a Go/NoGo task assessing executive functioning, while EEG was recorded. Additionally, subjective cognitive complaints (CFQ, PDQ-5) and clinical parameters (PANSS, ESI) were collected. Preliminary results indicated that SZP compared to HC showed a lower theta power level irrespective of condition and lower evoked theta power increases and lower total percentage changes in the NoGo condition. Besides, SZP reported more subjective complaints and showed worse Go/NoGo performances than HC. Considering the SZP group, evoked theta increases were associated with faster Go reactions and less subjective delusional perceptions, and better Go/NoGo performances were related to less psychopathological symptoms. These results indicate that theta power changes, especially evoked parts, serve as a marker of abnormal oscillatory changes in SZP. Linking these electrophysiological findings to the behavioral data, HC seems to recruit executive control resources more efficiently than SZP. These results could be explained within the dysconnectivity hypothesis of schizophrenia and underline the relevance of neural oscillations for an intact neurobiological network communication.

Keywords: theta power, neural oscillations, EEG, schizophrenia, dysconnectivity syndrome, executive functioning, cognitive control
Presentation type: Poster Presentation
Session: Clinical and Biological Psychology

In pursuit of saccade awareness

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Observers keep track of a moving target by combining two types of eye movements: pursuit eye movements that smoothly follow the moving target, and catch-up saccades that rapidly correct the gaze position when errors accrue. Here, we investigated if observers can learn to detect and control reflexive catch-up saccades during smooth pursuit eye movements.
In each trial, we displayed a target moving horizontally at one of three constant speeds (3, 6, or 9 dva/s). In half of the trials, we additionally displayed two horizontally-extended stimulus bands above and below the target trajectory consisting of vertically oriented gratings. These stimulus bands were rendered invisible during the slow pursuit movement by rapid temporal phase shifts (>60 Hz). The bands, however, could become visible when a sudden slowing of the phase shift—either because of a catch-up saccade or its replayed retinal consequence—briefly stabilized the stimulus band on the retina. We asked observers to report whether they detected (1) the stimulus bands (visual sensitivity) and (2) the generation of a catch-up saccade (motor sensitivity). Observers were instructed to utilize the immediate visual feedback of the stimulus to suppress catch-up saccades.
Observers showed high visual but low motor sensitivity, which did not improve significantly over four experimental sessions. Moreover, the number of catch-up saccades did not decrease with increasing session number and saccade sensitivity remained independent of detecting the stimulus bands throughout. Overall, we conclude that observers lack the ability to detect or control their reflexive catch-up saccades during smooth pursuit eye movements.

Keywords: Eye movements, Conscious processing, Signal Detection Theory
Presentation type: Oral presentation / Talk
Session: Action Control

The pretesting effect under divided attention

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Completing a pretest (e.g., frog – ?) before receiving feedback on the correct answer (e.g., frog – pond) can improve long-term retention of the material compared to material that was initially only studied. The present study examined whether this pretesting effect requires attentional resources during the initial pretest phase or the subsequent feedback phase. To this end, participants studied word pairs (e.g., frog – pond) which were either presented in full for 12 s and thus could be studied immediately (study-only trials) or were first only presented with the cue word of a pair and asked to guess the target word (e.g., frog – ?) for 6 s before the complete pair was shown for another 6 s (pretest trials). Critically, the study-only and pretest trials took place either under full attention or under distraction by a secondary task, with the distraction occurring either only during the first 6 s or the last 6 s of a trial. While results showed a typical pretesting effect in the absence of any distraction, the pretesting effect remained intact when distraction occurred during the first 6 s of a pretest trial but was eliminated when distraction occurred during the last 6 s. The findings suggest that atttentional processes can play a critical role for the pretesting effect, though primarily during the feedback phase of a learning trial. The implications of these findings for prominent accounts of the pretesting effect, such as elaboration and attentional accounts, are discussed.

Keywords:
Presentation type: Oral presentation / Talk
Session: Test-enhanced learning

Measuring the impact of perceived human-likeness on trust calibration and performance in human-robot teams

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System-wide trust (i.e., all teammates are trusted equally) is a phenomenon in teams containing non-human members, such as robots or artificial intelligence (AI). If trust is not calibrated according to team members' individual abilities (i.e., component-specific trust), team performance may be negatively impacted due to under-trust in capable and/or over-trust in relatively incapable teammates. The goal of our study is to examine whether trust calibration and performance in human-robot teams can be improved via interventions that support the ability and willingness to see group members individually. We hypothesize that interventions increasing robots' perceived human-likeness - by giving them typical human names and voices - will improve trust calibration (i.e., from system-wide to component-specific trust) and performance. Participants will work alongside three robots on a collaborative search task in a virtual reality environment. The robots' perceived human-likeness will be manipulated between-participants. 52 participants will be collected based on a power analysis assuming a medium-high effect size. Effects of this manipulation will be measured via subjective rating scales (e.g., single-item-trust-rating), as well as objective measures, such as eye tracking (e.g., average count of fixations in the robot teammates' search quadrants) and performance data (e.g., number of targets found by the team). The proposed project is unique in that it (1) is the first to investigate the construct of system-wide vs. component-specific trust in the human-robot teaming context and (2) uses objective methods with high internal validity to investigate trust calibration in human-robot teams embedded into realistic interactions with high external validity.

Keywords: human-robot-interaction, trust, VR, perceived human-likeness, multi-robot-interaction
Presentation type: No-Data Poster
Session: Human Factors II

Investigating Age Effects on Face Adaptation

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Adaptation effects have been observed for many dimensions of faces and are a sign for the plasticity of our perceptual and memory system. However, this evidence in the face adaptation literature is mostly limited to younger adults (YAs). In the present study, we aim to examine if this plasticity is specific to YAs or if it is at least to some degree independent of age. Since, among others, the ability to integrate newly acquired information is impaired in older adults (OAs) we hypothesised that face adaptation effects are less pronounced in healthy OAs in comparison to YAs. We induced face adaptation effects for non-configural brightness information in YAs and OAs in online experiments. Our studies show that exposure to an image of a familiar face with strongly manipulated brightness (increased or decreased) alters the perception of subsequent face stimuli: original, non-manipulated face images then appear to be manipulated, while images similar to the adaptor are perceived as "original". However, inconsistent with our hypotheses, these adaptation effects occur to a similar degree across age groups, demonstrating adaptation effects not only in YAs, but also in OAs. According to our knowledge, this is one of the first demonstrations of face adaptation effects in an older age group. We discuss the results in the context of plasticity of the visual system.
Keywords: face adaptation, face perception, face memory, non-configural face information, age effects, ageing, plasticity
Presentation type: Oral presentation / Talk
Session: Facial Expressions I

Understanding Rule Representation - Spontaneous Mental Simulation of Stimulus-Response Mappings

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Rules and instructions can exert a powerful influence on behavior, even when they have never been followed before. Existing evidence suggests that the processing of a rule results in a state of mental preparedness that enables efficient and automatic response activation. We present results supporting the idea that that this state is partly achieved by spontaneous mental simulation of responding to the instructed stimulus-response rule. Using electromyography, I compared response-specific muscular activity in the right and left forearm during the presentation of instructions mapping a right or a left key press. As predicted by the mental simulation hypothesis, activity was higher during congruent than incongruent instructions in both forearms. Mental simulation, therefore, seems to be a promising mechanism to explain how rules become incorporated in the human cognitive system.
Keywords: rules, stimulus-response associations, electromyography, mental simulation, motor imagery
Presentation type: Poster Presentation
Session: Cognitive Control and Conflict II

Predictive language processing in active psychosis and psychotic remission

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Schizophrenia is associated with a wide range of language alterations. Interestingly, the recent predictive coding account does not only provide a testable theory for the explanation of positive symptoms in schizophrenia, but is also one of the most promising theories of language processing. Experimental evidence of the predictive coding account of psychosis suggests that an overweighing of sensory likelihood may occur at lower levels (e.g., early sensory processing areas) due to increased dopamine activity causing aberrant salience and leading to delusions, while an overweighting of prior beliefs at higher levels, potentially caused by altered glutamatergic receptor signalling, may cause hallucinations. The interplay of prior information and sensory likelihood can be tested efficiently during language processing, due to its predictive nature. This study therefore investigates (1) how the use of prior knowledge relative to sensory information in a predictive language task changes when patients with schizophrenia transition from acute psychosis to psychotic remission, and (2) whether an overreliance on prior semantic knowledge induces conditioned hallucinations in a state of acute psychosis, but not in a state of psychotic remission.
Using a longitudinal approach, we assessed 20 patients with schizophrenia first during a state of active psychosis and then, after approximately three months, in a state of psychotic remission. Controls were assessed at two similarly delayed time points. All participants completed a predictive language paradigm in which they listened to sentences of varying predictability (e.g., high predictability: “Goethe was a famous German … poet”; low predictability: “Next to the window was a … hole”). The final word of each sentence (e.g., “poet” or “hole”) was degraded in clarity using a noise vocoding algorithm; degradations were available in four levels from fully unintelligible to fully intelligible. After listening to the full sentence, participants were asked to report the word they perceived, assessing conditioned hallucinations. We fitted a linear Bayesian regression model to estimate the prior weight which presents the relative strength of the prior over the sensory input. Using a repeated measurement model, we compared prior weights and conditioned hallucinations across time points and groups. Furthermore, we correlated those with positive symptoms at both time points.
The modelling results revealed that prior knowledge relative to sensory information was overweighed in patients compared to controls, but especially during the first time point, when patients were in a state of acute psychosis. The same relationship was detected for conditioned hallucinations. Furthermore, patients with stronger psychotic symptoms perceived more conditioned hallucinations, but this positive correlation was only present during the acute psychotic state and absent during the state of remission.
This study shows that prior knowledge was overweighted during a language perception task in schizophrenia patients during an acute state of psychosis, and less so during psychotic remission. Importantly, overweighting prior knowledge and stronger psychotic symptoms were linked to experiencing more conditioned hallucinations. Taken together, this study provides novel evidence of how alterations in predictive language processing change when schizophrenia patients change from an acute to a remitted state of psychosis and how this is contributes to the formation of hallucinations.

Keywords: Language processing, predictive coding, psychosis, Bayesian inference
Presentation type: Oral presentation / Talk
Session: How do auditory and speech processing alterations contribute to symptoms in psychosis: a predictive coding approach

Modelling the decision-making in a transdiagnostic sample to investigate disease specific and disease general alterations

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Alterations in decision-making have been suggested to underlie different psychiatric illnesses, such as depressive disorder (MDD), obsessive-compulsive disorder (OCD), and schizophrenia. Studies report overlapping and divergent alterations in individuals diagnosed with these disorders linking to their respective symptoms. As these disorders often occur as comorbidities, it is crucial to disentangle alterations in decision-making that are unique to specific disorders, from those that occur across diagnostic boundaries. Recent developments in computational modelling have enabled a mechanistic deconstruction of decision-making processes, facilitating the identification of disease-specific and disease-general alterations. We, therefore, used two computational modelling approaches to a two-step Markov decision task in a transdiagnostic cohort combining individuals with MDD (N=23), OCD (N=25), and schizophrenia (N=27) to identify disease-specific and disease-general decision-making alterations, and associations with symptoms. The results revealed overall reliance on model-free decision-making behavior across all groups. Additionally, schizophrenia patients showed lowest learning rate in stage one and highest switching rate (lowest perseverance) compared to all other groups. All patient groups were more random than controls in stage two, with schizophrenia patients revealing highest levels of randomness, while OCD patients were significantly more random in stage one compared to controls and MDD patients. Importantly, the findings revealed a correlation between increased model-free behavior and elevated depressive symptoms, while more model-based choices were linked to lower levels of anhedonia across all patients. Consequently, the findings emphasize noteworthy disease-general and disease-specific decision-making alterations in MDD, OCD, and schizophrenia patients, suggesting that concurrent alterations and symptoms might potentially have common underlying behavioral mechanisms.

Keywords: transdiagnostic, schizophrenia, obsessive-compulsive disorder, major depressive disorder, computational psychiatry, decision-making, reward processing
Presentation type: Oral presentation / Talk
Session: Clinical Psychology

The influence of distance on crossmodal loudness-number interactions

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Prior studies indicate that loudness and number magnitude influence the processing of each other (e.g. Hartmann & Mast, 2017). This influence is typically explained by the assumption that loudness and numbers are represented on a generalized magnitude representation system (e.g. A Theory of Magnitude, Walsh, 2003). To draw further conclusions about the underlying processes, I investigated the loudness-number interaction in speeded-discrimination tasks with regard to the influence of distance and bidirectionality in two different experiments. In experiment 1 ($N = 32$), participants decided whether a visually presented number was larger or smaller than five and simultaneously heard a loud or soft tone with different loudness distances to a fixed intermediate loudness level. Experiment 2 ($N = 32$) was a cued task-switching paradigm in which participants switched between a loudness and a number classification task. Distance to an implicit standard was varied in both dimensions.
There was a significant interaction between loudness and number magnitude in both experiments with shorter reaction times in congruent trials (loud tone and large number or soft tone and small number) compared to incongruent trials. This interaction was present in the loudness and number classification task indicating a bidirectional influence between both dimensions. With regard to the influence of distance, only loudness distance modulated the loudness-number interaction and the effect differed between both experiments and tasks. I will discuss the results with regard to potential processes underlying loudness-number interactions and the implications for an assumed generalized magnitude representation system.
Keywords: loudness, number processing, magnitude representation, ATOM
Presentation type: Oral presentation / Talk
Session: Numerical Cognition / Crossmodal Perception

Semantic incongruence affects N400 amplitude during face recognition

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N400 is a cortical potential measured on lateral-occipital and central-parietal electrodes typically in tasks when a word does not fit into an otherwise meaningful sentence. Matching semantic content, however, is also a crucial process during face recognition, when visual features have to be paired with consciously accessible semantic information. Previous research has shown that mismatched stimuli impose a cognitive load on face recognition, and therefore increase response time. In addition, the amplitude of the N400 component increases proportionally with semantic mismatch, regardless of stimulus modality. Generally, N400 can also be measured in stereotype-inconsistent situations. The question is whether this effect can be detected in a face recognition task and whether the magnitude of semantic mismatch affects reaction times and the amplitude of N400.

We pre-measured the semantic distance between occupational labels. Participants learned to recognize faces that were stereotypically matched to these. In the recognition task the faces were preceded by different types of priming stimuli: either with the original label (congruent condition) or with an incorrectly paired label (incongruent conditions). The task was to press different response buttons depending on whether they have seen the face before or not.

We found that in the presence of a mismatched stimulus, both N400 amplitude and RT increased. The larger the representational distance between the learned and the presented labels, the larger was the amplitude of the N400. This implies that semantic matching is a decisive process in face recognition, and evoked cortical potentials reflect a general underlying mechanism of information recollection.

Keywords: face recognition, semantic mismatch, ERP, reaction time, information recollection
Presentation type: Poster Presentation
Session: Perception II

Assessing the influence of cognitive demands in dual tasks on balance control: An event-related approach using aligned force-plate data

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Cognitive-motor interference research investigates how balance control demands affect cognitive task performance and vice versa. In a recent study, balance control parameters were measured continuously with a force plate during quiet standing and analyzed in an event-related manner. The results show that single cognitive operations that resolve response conflict in the Simon task reduce variability in balance control prior to the manual response. Here, we used this event-related methodology during a cognitive dual task. This dual task consisted of a visual short-term memory task with a delayed verbal response and an auditory-manual reaction time (RT) task. We manipulated the stimulus onset asynchrony (SOA: short vs. long) between the visual and auditory stimuli, and whether participants had to report or ignore the visual task (task load: single vs. dual task). Manipulations were applied on a trial-by-trial basis or in blocks of predictable versus unpredictable task load. RTs in the auditory-manual task were higher during short SOA, suggesting a bottleneck-like effect. This effect was particularly pronounced for unpredictable task load, possibly due to the maintenance of two task sets for both report (dual task) and ignore (single task) trials. When assessing balance correlates of cognitive conflict for SOA and task load, similar patterns were found during response selection. Specifically, there was increased sway variability during short SOA, which was pronounced in unpredictable blocks. We suggest that during the bottleneck and multiple task-set maintenance, there is an interference with the occurrence of intermittent control impulses governing balance processes, resulting in increased sway variability.

Keywords: balance control, cognitive control, cognitive-motor interference, dual task, event-related, force plate

Presentation type: Oral presentation / Talk

Session: Embodied Cognition

Simon and Me: The influence of self-related information in vertical and horizontal Simon tasks

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The Simon task shows is used to investigate how task-irrelevant spatial features influence performance. In the present study, we combined both, findings of agency manipulation as well as spatial layout in an enriched Simon task. Our experiments aim at investigating whether implied agency information modulates the Simon effect and if so comparable for horizontal and vertical layout. Using drawings of stick-figure manikins holding a colored ball in its left or right hand displayed at the screen's center. Agency labels ("me", "friend" or "colleague") were presented in the stick-figure manikin's center. Both horizontal and vertical versions of the Simon task were used. It was hypothesized that perceived agency modulates the horizontal and vertical Simon effect differently. Results of Experiment 1 confirmed this prediction, influences of labels were only seen in the horizontal version of the Simon task. To replicate and pin down the time course, Experiment 2 used a stimulus onset asynchrony.

Keywords: spatial compatibility, self, cognitive conflict
Presentation type: Oral presentation / Talk
Session: Simon and his friends: New insights into the processing of task-irrelevant information

The neural signature of language-based prediction errors in individuals with psychotic-like experiences

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The neural signature of language-based prediction errors in individuals with psychotic-like experiences

Background:
Hallucinations occur in many psychiatric disorders, such as psychosis or schizophrenia. Still their underlying mechanisms pose many questions. The theory of Predictive Coding (PC) offers an explanation. PC assumes an imbalance in the weighting of prior knowledge and incoming sensory (i.e. prior weight) information in psychosis, which leads to an aberrant prediction error processing. Former studies revealed that the neural signature of reward-based prediction errors is different in psychosis patients compared to healthy population. Although language functions are disrupted in individuals with psychosis, it is unclear whether the processing of language-based prediction error is altered.

Methods:
We used an fMRI language paradigm, in which sentence entropy, intelligibility and surprisal of the sentence final word was varied. This allowed us to measure the prior knowledge and the prediction error, as well as the computational analysis of the prior weight. We collected data form individuals with (N=10) and without (N=10) psychotic-like experiences (Data collection ongoing).

Results:
The preliminary results revealed group differences in language-based prediction errors in the left superior temporal gyrus (STG). The activation in the STG was negatively linked to symptom strength and to prior weight, indicating that those individuals with stronger symptoms show a reduction in the language-based prediction error signal and an overweighting of prior information.
Taken together, these preliminary results show for the first time alteration in language-based prediction error processing in the STG in individuals with psychotic-like experiences.

Keywords: Psychosis, Predictive Coding, language-based prediction error
Presentation type: Poster Presentation
Session: Clinical and Biological Psychology

About cross-modal commutativity in magnitude production

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Can we compare the loudness of a tone to the brightness of a light? The answer is yes. We are intuitively capable of these cross-modal comparisons. Psychophysical researchers such as Stevens have long assumed that these cross-modal comparisons are mediated by a single scale of subjective intensity. Luce (2002) developed a psychophysical theory for physical intensity making Stevens' assumptions towards an underlying scale of perceived intensity explicit and formulating empirically testable conditions for it. They identified cross-modal commutativity as a property through which the theory can be tested. We investigated this property in a cross-modal magnitude production task between auditory and visual stimuli, concerning their loudness and brightness respectively. Participants were presented with the two stimuli and instructed to, for example "make the tone 3 times as loud [as the visual stimuli appears bright]". This was partly a replication of Ellermeier et al. (2021). They concluded that cross-modal commutativity holds whereas we find inconclusive evidence in a Bayesian analysis. Additionally, in a theoretical analysis, we find evidence that role-independence of the internal references used in magnitude production is violated. In an expansion of Luce's theory, Heller (2021) concluded that cross- modal commutativity holds if and only if the internal references are role-independent, meaning they are not dependent on whether the reference pertains to the standard or the variable stimulus. This means, if role-independence of the references is violated, the assumed intensity scale can hold even if cross-modal commutativity doesn't. Evidence towards this conclusion and its implications will be discussed.

Keywords: psychophysicy, perception, intensity, crossmodal
Presentation type: Oral presentation / Talk
Session: Numerical Cognition / Crossmodal Perception

Factors influencing AI-supported decision-making in one-to-one face matching

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The demand for AI-based decision aids has seen a steep rise in a number of different fields. Among them, the use facial identification systems are becoming widespread, particularly in high stakes areas such as border control. The impact of design factors on human-AI teaming is still understudied. We aimed to asses factors associated with the design of the paradigm and presentation format of predictions from AI-systems, and their effect on human performance. In a series of experiments, we examined the impact of (a) implied AI accuracy, (b) mismatch frequency, and (c) explainable AI predictions on performance in a one-to-one face matching task. We found that participants' performance improves when aided by AI, compared to baseline, with greatest improvement observed when no information on AI's accuracy is provided. Further, mismatch frequency does not appear to influence performance. Finally, explainability does not help mitigate AI's errors, but does increase users' certainty in their own decision. Additionally, two findings were consistent across all experiments. First, participants often failed to dismiss inaccurate AI predictions, resulting in significantly lower performance accuracy compared to that in the accurate predictions condition. Second, on a group level, participants failed to outperform the AI, though examination of individual performance showed that some participants were able to exceed the AI's performance. These findings contribute towards determining appropriate design formats in a human-in-the-loop system, so that the performance of the human-AI team can be maximized.

Keywords: artificial intelligence, decision making, face matching, human-AI interaction, AI advice
Presentation type: Oral presentation / Talk
Session: AI and decision-making: Insights from varied applied settings

Behavioral characteristics of the caregiver-child interaction as potential influences on the infant's neural and behavioural processing of self-relevant information

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According to attachment theory, the self develops in caregiver-infants interactions: more sensitive caregivers raise children with a more coherent self (Sroufe, 1994). Recent accounts emphasize embodied caregiver-infant interactions, especially tactile and contingent interactions (Fotopoulou & Tsakiris,2017). In the current study, we measured the detection of contingent in multisensory bodily signals, an important aspect of self-perception (de Clerk, Fillipetti, & Rigato, 2021), in 51 5-month-old infants. We used a sequential looking preference paradigm with concurrent fNIRS-measurement covering tempo-parietal areas, similar to Fillipetti et al. (2015). Infants saw 15 s-long videos of their own face being stroked by a brush, that was either live (contingent) or delayed by 3 s (non-contingent). Maternal contingency, touch frequency and sensitivity were observed in mother-infant interactions. There was no significant looking preference and no maternal characteristics predicted the difference in looking behavior to both conditions. Within a region of interest (ROI) located over the right posterior temporal sulcus, infants showed more HbO-activity to the non-contingent display ($M_{contingent}$ = -0.05 µV, $M_{non\text{-}contingent}$ = 0.09 µV, p = .03). The difference in activation to both condition in this ROI was significantly predicted by maternal sensitivity (β = -0.15, p = .01) and touch (β = -0.52, p = .02). More of these maternal characteristics, however, led to less neural differentiation. Although these findings show that mother-infant interaction plays a crucial role in self-development, at least at an early age it seems to hinder self-development, potentially indicating self-other overlap between mother and infant.

Keywords: self-perception, contingency, touch, sensitivity, fNIRS, infancy
Presentation type: Oral presentation / Talk
Session: Self-Processing in the Social Mind: Insights from Behavioral and Neurocognitive Psychology

Binding of the feature stimulus duration in the auditory domain: SR- or SS-Binding; or both?

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Perceiving and reacting to multidimensional objects creates so-called event files via feature binding. Bogon, Thomaschke, and Dreisbach (2017) provided first evidence for the integration of the feature stimulus duration into such event-files. However, their paradigm did not allow to differentiate between stimulus-stimulus and stimulus-response binding. The present study used a classification task with many-to-one mappings that allows to examine the integration of stimulus and response features independently. Experiment 1 used a pitch classification task. Participants had to respond with a left keypress to a low and a very low sine-tone and with a right keypress to a high and very high sine-tone. The four sine-tones were presented for either a short or long duration, resulting in a total of eight stimuli. As an indicator of binding, we used partial repetition costs (better performance when both pitch/response and duration repeat or shift relative to partial repetitions). Results of Experiment 1 indicate stimulus-response binding and no stimulus-stimulus binding. In Experiment 2, instead of classifying the pitch of artificial sine-tones, participants had to classify the type of musical instruments that produced the stimulus tones. Results replicated evidence for stimulus-response binding, but also provided evidence for stimulus-stimulus binding. The potential relevance of duration in a musical context is discussed as a potential moderator of stimulus-stimulus binding.

Keywords: feature binding; partial-repetition costs; temporal features; stimulus-stimulus binding; stimulus-response binding; time perception
Presentation type: Poster Presentation
Session: Cognitive Control and Conflict II

Behavioral adaptation in the face of advanced driver distraction warnings: Theoretical considerations and challenges from a human factors perspective

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Advanced driver distraction warnings (ADDW) are a measure developed to manage and direct drivers' attention throughout the drive. Based on the driver's attentional status a warning is triggered by the system. The aim is to ensure that the driver stays attentive to the driving scene. ADDWs are intended to positively alter drivers' gaze behavior and to mitigate potential detrimental effects of distraction and increase traffic safety. Therefore, regulation and customer advocacy drive the introduction of an ADDW system. Soon, such systems will be a standard safety feature in new vehicles. However, previous research has primarily focused on the technological implementation of detecting the driver status. To date, it is still subject of debate whether ADDWs positively alter drivers' gaze behavior. Although the introduction ADDWs is intended to increase safety, this effect cannot be assumed, nor can other unintended or even undesirable effects be ruled out. Compared to existing warning systems (e.g., forward-collision warning), distraction warnings are triggered by the driver's gaze behavior. This means that the driver can adapt their behavior and positively influence the occurrence of the warnings. Based on theoretical background a model will be introduced, describing the process of behavioral adaption to distraction warnings. This serves as a basis for discussion on potential influencing variables on the effectiveness of behavioral adaption in the face of distraction warnings. Furthermore future investigations will be presented as investigating the impact of ADDW on drivers' gaze behavior is a prerequisite to evaluate their effectivity mitigating driver distraction.

Keywords: Driver Distraction, Driver Monitoring, Advanced Driver Distraction Warnings, Behavioral Adaptation

Presentation type: Poster Presentation

Session: Cognitive Control and Conflict I

Habits, Goals, and Behavioral Signs of Cognitive Perseveration on Wisconsin Card-Sorting Tasks

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Wisconsin card-sorting tasks provide unique opportunities to study cognitive flexibility and its limitations, which express themselves behaviorally as perseverative errors (PE). PE refer to those behavioral errors on Wisconsin card-sorting tasks that are committed when cognitive rules are maintained even though recently received outcomes demand to switch to other rules (i.e., cognitive perseveration). We explored error-suppression effects (ESE) across three Wisconsin card-sorting studies. ESE refer to the phenomenon that PE are reduced on repetitive trials compared to non-repetitive trials. We replicated ESE in all three Wisconsin card-sorting studies. Study 1 revealed that non-associative accounts of ESE, in particular the idea that cognitive inhibition may account for them, are not tenable. Study 2 suggested that models of instrumental learning are among the most promising associative accounts of ESE. Instrumental learning comprises goal-directed control and the formation of corresponding associative memories over and above the formation of habitual memories according to dual-process models of instrumental learning. Study 3 showed that cognitive, rather than motor, representations of responses should be conceptualized as elements entering goal-directed instrumental memories. Collectively, the results imply that ESE on Wisconsin card-sorting tasks are not only a highly replicable phenomenon, but they also indicate that ESE provide an opportunity to study cognitive mechanisms of goal-directed instrumental control. Based on the reported data, we present a novel theory of cognitive perseveration (i.e., the 'goal-directed instrumental control' GIC model), which will be outlined in the presentation.

Keywords: executive control, cognitive flexibility, perseveration, error suppression, instrumental learning, habitual control, goal-directed control
Presentation type: Oral presentation / Talk
Session: Clinical Psychology

The theta-rhythm in early brain development and learning

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The ~3-6Hz theta rhythm has been assigned a crucial role in learning processes, from the first years of life to adulthood. In this talk I will briefly summarize the current state of knowledge and present our recent work on the theta rhythm in early brain development. Most critically, across several studies we found that the theta rhythm is present from the first years of life and involved in the processing of novel and unexpected information. This proposal is in further supported by two of our recent studies. In a first study, we focused on how novel representations are built, by presenting several object stimuli repeatedly, at 6 and 12 months. We found that theta oscillations increase over the first repetitions of a stimulus, but reduced thereafter, and that theta connectivity was higher for unknown stimuli (only shown once), compared to already familiarized stimuli. This indicates that novel information is processes in more extended neural networks, to be integrated over time, when global activity becomes reduced. In a second study we tested the effect of rhythmic stimulation at different frequencies in 9-months-olds and found a resonant phenomenon at 4Hz across a variety of stimulation frequencies, indexing a specific role in perceptual processing in the infant brain. I will discuss these findings in light of the idea that the theta rhythm is an ontogenetically preserved learning mechanism, allowing developing humans to integrate novel information into their developing (semantic) models of the world around them, starting in the infant years.

Keywords:
Presentation type: Oral presentation / Talk
Session: Advances in Developmental Cognitive Neuroscience

Subjective Uncertainty in Pointing

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People often communicate with pointing gestures in their daily life. It was previously found that a point does not indicate a specific location but rather a (small) area. We still do not know, which spatial information pointer expect they are conveying with their gestures. We assume pointers scan the target's surrounding that they believe the gesture is covering to find an appropriate target description, so pointers' gaze pattern should represent the area of subjective uncertainty associated with their pointing gesture. We hypothesized that pointers are overconfident concerning their gesture's accuracy and therefore, the fixated area should be smaller than the area in which the observers' interpretation fall.
To examine on this, two participants holding either the pointer or observer role were invited to the lab and were seated in front of a big screen. In each trial, the pointer had to point towards one target shape among 179 similar distractor shapes – or depending on condition, could additionally describe it – while the observer had to identify the target shape. To measure subjective uncertainty, eye movements of both, observers' answers and identification confidence were recorded. Unsurprisingly, correct target identification was enormously facilitated, and confidence rating was higher when pointing was accompanied by verbal description. Furthermore, the results support our hypothesis as the fixated area by pointers was smaller than the observers' interpretation area and additionally, both centers significantly differ. Thus, pointers overestimate the accuracy of points and did not consider interpretation biases and situational factors.

Keywords: Pointing Production, Eye Tracking, Visual Communication
Presentation type: Poster Presentation
Session: Motor and Action Control

Cognitive control of conflicting visual features despite urgency

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Cognitive control ensures that in conflict situations, humans can coordinate information from the environment with their internal goals, in order to react in a goal-driven manner. Previous studies revealed, that cognitive control is heavily influenced by urgency. In high-urgency situations, it was shown, that reactions in a cognitive control task are dominated by stimulus-driven information rather than goal-directed information. Critically, however, most previous studies used cognitive control tasks that involved a processing asymmetry between the stimulus-driven information and the goal-directed information, leaving it unclear, whether urgency affects cognitive control in general. Here, we investigated, whether urgency also impacts performance in a task, that evokes a stimulus-stimulus conflict between similarly processed stimuli. In two experiments, an urgency paradigm was applied to two Eriksen Flanker tasks, one using color stimuli and the other one using letter stimuli. In both experiments, urgency did not evoke a dominance of stimulus-driven information over goal-directed information and thus a drop of performance below chance level in the incongruent condition. These findings could suggest, that urgency does not impact cognitive control for all stimuli. Rather, urgency could affect cognitive control only for conflicts arising from an efficiently processed stimulus-dimension (such as space), leaving cognitive conflicts from equally processed stimulus-dimensions unaffected.

Keywords: Cognitive Control, Cognitive Conflict, Urgency, Eriksen Flanker Task
Presentation type: Poster Presentation
Session: Cognitive Control and Conflict II

Do Female Leaders Face Greater Scrutiny for Mistakes? Results of an Experimental Study of Leader Errors

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Extensive research examines gender-based expectations on perceiving effective leadership, while limited understanding exists about their impact on assessing leaders' errors. Building upon role congruity theory (Eagly & Karau, 2002) and the communality-bonus effect (Hentschel et al., 2018), we investigate whether female leaders get penalized more for making errors than male leaders. Moreover, we investigate how different error types and leader apology (expectancy) moderate the relationship between leader errors and followers' leader evaluations.

In a first study, a **6** [different leader error situations] x **3** [error type] mixed experimental design, a set of leader error vignettes will be investigated for error perception and exploratory analysis. Based on this, in a second study with a between-subjects experimental design (**3** [task-related vs. relational vs. no leader error] x **2** [leader gender] x **2** [apology vs. no apology]) the hypotheses will be tested. Results of the first study will be presented and inform a colloquial discussion about the further design.

A better understanding of gender-based evaluations of leader errors will contribute to identifying inequalities between male and female leaders and potentially advance gender equality by pointing to strategies to mitigate these.

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Keywords: Leader errors, leadership, gender, role congruity, communality-bonus effect
Presentation type: Poster Presentation
Session: Interaction and Social Psychology

Improving Intuitive Estimates of Food-Related Water Use

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Water scarcity is a growing concern spurred by the climate crisis, and food production is a significant contributor to water use. One effective way to address water scarcity is thus to make consumers aware of how food products differ in the amount of water used in their production. How well do people know how much water is used to produce food products? And how can people's estimation accuracy and food choices be improved? In an online study (N = 102), participants estimated the water used to produce various food products in liters. Then they received either the actual water use (seeding), a simple rule to estimate water use (rule), or they read an unrelated text (control). Then they provided estimates for previously judged as well as new food products. Finally, participants indicated which of four shopping lists of food products they considered to be associated with the lowest water use. Participants' initial estimates were rather poor, underestimating water use by 2,652 liters on average. The rank correlation of the estimates with the actual water use was merely r = .17. Seeding improved estimates and ranking accuracy relative to the control condition, while the rule improved only the ranking accuracy. Shopping list selection was most accurate in the seeding condition and worst in the control condition. Our results demonstrate that a simple intervention improves people's estimation accuracy and enables them to make more sustainable food choices.

Keywords: real-world estimation, water use, seeding, simple rule, learning, sustainability
Presentation type: Poster Presentation
Session: Human Factors I

The roles of source trustworthiness and emotionality for sharing headlines on social media

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The spread of online misinformation is a growing societal problem, making it essential to understand which factors influence individuals' decisions to share information on social media (Schünemann, 2022). In an online experiment, we manipulated the trustworthiness of the alleged source of 41 fact-checked news headlines (e.g., *AfD zahlt Demo-Teilnehmern Geld*). We presented the statements as coming either from one of three trustworthy websites taken from Behre et al. (2023; e.g., *tagesschau.de*) or from a fictitious news site, which people should view with more scepticism (e.g., *tagesaktuell.de*). Each headline was displayed for 5500ms. 90 participants indicated whether they would share the respective headline or not. They were more likely to share messages perceived as coming from a trustworthy source than from fictitious sources ($t(89)=2.45$, $p=.008$; $d=.258$). Using only headlines which were pre-rated as high ($n=12$) or low ($n=6$) in emotionality, an ANOVA also revealed a main effect of emotionality: Emotional headlines were more likely to be shared than less emotional statements ($F(1,89)=43.41$, $p<.001$, $\eta^2=.127$), but the interaction between source and emotionality was not significant. Despite some open methodological challenges, we hold that experimental psychology can play an important role in identifying factors which contribute to the spread of misinformation.

Behre et al. (2023). *Reuters Institute Digital News Report 2023*. https://doi.org/10.21241/ssoar.86851
Schünemann (2022). A threat to democracies? An overview of theoretical approaches and empirical measurements for studying the effects of disinformation. *Cyber Security Politics*. https://doi.org/10.4324/9781003110224-4

Keywords: misinformation, trustworthiness, social media, credibility, emotionality, news
Presentation type: Oral presentation / Talk
Session: Misinformation

Feature-dependent perception of auditory apparent motion

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We can perceive objects as moving by connecting them across space and time. This is possible even when the objects are not present continuously, as in the case of apparent motion displays like the Ternus Display. In this display, two stimuli are presented, one at the centre and one shifted to the left, followed by an empty interval, after which two stimuli are presented, one at the centre and one shifted to the right. This display is ambiguous, as depending on which stimuli are connected, it can be perceived as both stimuli moving uniformly to the right (group motion) or one stimulus moving across the stationary centre stimulus (element motion). Which percept is seen can be influenced by the interstimulus interval (ISI) of the empty frame and the stimulus features. Previously we showed that the Ternus effect also exists in the auditory domain and that the percept is dependent on the ISI. This evidence suggests similar mechanisms in the visual and auditory domain. To test this idea, we investigated whether the auditory Ternus effect is also dependent on the stimulus features by creating a frequency-based bias. This bias was either compatible with element motion by presenting the outer tones in the same frequency or with group motion by presenting the first tone in each frame in the same frequency. Our results showed an influence of this feature bias, suggesting that the visual and the auditory domains might both use the same mechanism to connect objects across space and time.

Keywords: apparent motion, auditory perception, correspondence problem
Presentation type: Poster Presentation
Session: Perception II

How Motor Coordination Can Induce Social Identification - A Joint Action Perspective

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Existing research has shown a link between social identification and motor coordination: identification affects performance of coordinated action, for example. However, beyond research focusing specifically on synchronous movements, there is no systematic approach examining more general motor coordination as a causal factor in social identification. Drawing on joint action theory, we predicted that any form of coordination should induce co-representation, which should in turn increase social identification. We tested this in a novel dual-joystick paradigm in which participants performed joint tasks varying in (non-synchronous) coordination requirementsin a repeated-measures design (N=45). When task segments were discrete between partners, they identified less as a group than when they had to coordinate their behavior. Furthermore and surprisingly, although constant coordination increased co-representation relative to intermittent coordination, it did not correspondingly increase social identification. Exploratory analyses showed that worse performance in the constant coordination task may explain this finding, as performance correlated positively with social identification (only) in the coordination conditions. A second experiment tested this explanation by subtly manipulaing performance in otherwise identical constant coordination tasks in a repeated-measures design (N=53). In line with the preceding results, social identification was higher in the high performance condition, while co-representation was the same regardless of performance. Our findings suggest both that coordination in general may increase social identification and that effective coordination performance is an important contributing factor. Thus, we provide impetus towards integrating existing findings that synchronous movement effects social identification into a broader theoretical perspective informed by joint action theory.

Keywords: Social identity, joint action, motor coordination, group performance, identification
Presentation type: Oral presentation / Talk
Session: Joint Action

When facial expressions and actions do not fit: Conflict adaptation in social interactions

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Face-to-face social interactions are an important part of our everyday lives, yet coordinating with another person can be challenging as it requires efficient processing of social cues. Previous studies found that observers use an interactive partner's facial emotional expressions to predict upcoming actions and prepare responses. However, facial expressions may not always be reliable sources of information. It remains unclear whether persons can adapt to the pattern by which an interactive partner uses facial emotional expressions and actions in social interactions. Therefore, we conducted a Virtual Reality study (N = 48) where participants interacted with two virtual agents. For each agent we manipulated proportions of congruency between facial emotional expressions and subsequent socially relevant actions (e.g., happy facial expression followed by greeting [fist bump: congruent] or punch action [incongruent]). Participants interacted with a mostly congruent (MC agent, 75% congruent) and a mostly incongruent agent (MI agent, 75% incongruent) while response times and gaze behavior were measured. We found slower responses to incongruent compared to congruent actions only when interacting with the MC agent but not when interacting with the MI agent. Furthermore, gaze data revealed that fixations on the face region were longer for unexpected compared to expected behavior in terms of congruency proportion. These data show that persons are sensitive to individual patterns of facial expressions and actions and can adapt their responses accordingly. This represents a potential mechanism to deal with variance in the use of social cues across social interactions.

Keywords: Social Interaction, Emotion, Action, Conflict Adaptation, Congruency, Response Times, Eye Tracking
Presentation type: Oral presentation / Talk
Session: Facial Expressions II

Spontaneous and strategic retrieval of event memories in young children

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Asking direct questions like "Tell me all you remember about X" is the predominant method when examining event memories in young children. To respond to such questions, children will have to engage in strategic retrieval involving a deliberate search process. Whereas the search component is by itself trivial for adults, it is cognitively demanding for young children due to the protracted development of prefrontal cortex.

However, spontaneous retrieval is an important, yet until recently, largely overlooked, alternative mode of retrieval requiring less cognitive effort. Spontaneous retrieval is based on simple associations, typically triggered by distinct cues in the context, and as such neither a result of questions asked nor of deliberate search strategies. Although most parents probably have experienced their children having spontaneous recollections, and even though involuntary memories—the 'adult' equivalent to spontaneous recall—have been examined extensively, surprisingly little is known about young children's spontaneous memories.

In this presentation I will review some recent studies that have contrasted strategic and spontaneous retrieval in three- and four-year-old children. The findings suggest that strategic retrieval is more demanding than hitherto assumed, and that spontaneous retrieval may be an ontogenetic forerunner of strategic retrieval of past events. I shall argue that both modes of retrieval are important when pursuing a comprehensive understanding of the development of event memory.

Keywords: event memory, children, spontaneous retrieval, strategic retrieval
Presentation type: Oral presentation / Talk
Session: Retrieval processes in autobiographical remembering

Temporal Illusions in Peripheral Vision: The Effect of Eccentricity on Subjective Duration varies with the investigated Duration Range

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Research has shown that the perceived duration of short stimuli in the visual periphery decreases as eccentricity increases. However, conflicting results have been found by studies using other methods to investigate subjective duration or longer durations. The aim of this study is to investigate how stimulus eccentricity affects perceived duration across different duration ranges. Using the temporal bisection task and carefully controlling for fixation, participants categorized the duration of stimuli presented at 3° or 9° eccentricity as short or long in three separate experiments. Experiment 1 examined short durations ranging from 20-220 ms, Experiment 2 examined long durations from 400-1600 ms, and Experiment 3 examined intermediate durations ranging from 160-660 ms. We replicated the decrease in perceived duration for stimuli presented at larger eccentricities for the short durations investigated in Experiment 1. Interestingly, the effect reversed for the long durations of Experiment 2. But, there was no significant difference between eccentricities for the intermediate durations of Experiment 3. We discuss the results with regard to possible differences in attentional mechanisms determining the processing of short and long durations.

Keywords: Duration estimation, Time perception, Temporal bisection task, Visual periphery, Eccentricity
Presentation type: Poster Presentation
Session: Perception I

The impact of embodiment on trust calibration and performance in a virtual team environment

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System-wide trust (SWT; i.e., all teammates are trusted equally) is a common phenomenon in teams that contain automated aids, such as algorithms or artificial intelligence (AI). If trust is not calibrated according to team members' individual abilities (i.e., component-specific trust; CST), performance may be negatively impacted due to under-trust in capable teammates and/or over-trust in incapable teammates. The aim of our study is to examine whether enhancing trust calibration and performance in human-AI teams is achievable through interventions that support individuation, enabling the perception of AIs as individuals rather than a homogeneous group. We hypothesize that embodying the AI in a robot form, thereby transforming the human-AI interaction into human-robot interaction, will improve individuation and consequently enhancing trust calibration and team performance.
Participants will collaborate with either three AI's (no physical representation), three humanoid robots, or three humans in a virtual reality setting. 66 Participants will be collected based on a power analysis assuming a medium-to-high effect size. Effects will be assessed through subjective rating scales (e.g., single item trust/reliability rating) and objective measures, such as eye tracking (e.g., number of fixations) and team performance data (e.g., number of targets found). The project is unique as it is the first to investigate the dynamics of SWT versus CST in human-robot collaboration and uses objective measures with high internal validity to investigate trust calibration in human-AI/robot teams with a high external validity. Findings will help identify effective influences of trust calibration and developing/validating objective measures of trust relevant to human-AI/robot teams.

Keywords: artificial intelligence, human-robot team, trust calibration, trust measurement, eye tracking, embodiment, visual search
Presentation type: No-Data Poster
Session: Human Factors II

The Forward Testing Effect in Online Text Learning: On the Role of Retrieval Motivation

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Recalling previously learned information enhances subsequent learning of new information. This forward testing effect (FTE) has been scarcely examined with complex text materials. The underlying mechanisms of the FTE are still unclear, especially regarding the potential role of extrinsic motivation. We tested the hypothesis that the FTE is partially related to enhance participants' motivation to retrieve all previously learned information, and that this achievement motivation can be manipulated by providing an external reward. The present study investigated the moderating effect of extrinsic motivation on the FTE, using a 2 (interim learning task: retrieval vs. restudy) × 2 (external motivation: high vs. low) between-subjects design in a digital learning setting. More specifically, participants studied three text sections; after Texts 1 and 2, they restudied or recalled the previously learned text information. All participants took a final free-recall test after Text 3. Briefly before the final test, participants were instructed that the best-performing 10% of the students (high motivation group) versus a random selection of 10% (low motivation group) would receive 10 Euros. Consistent with the hypothesis, we observed that retrieval practice enhanced recall of Text 3, replicating the FTE for complex materials in a digital learning setting. Critically, the size of this FTE was moderated by the level of extrinsic motivation: The FTE was reliable for the low motivation group but vanished for the high motivation group. This finding supports motivational theories of the FTE by demonstrating that participants' motivational level is critical in a digital learning setting.

Keywords: forward testing effect, motivation, future learning, text learning
Presentation type: Oral presentation / Talk
Session: Test-enhanced learning

Performing Task 1 but not Task 2 Is Sufficient for the Activation of Task-Order Information in Dual-Task Situations.

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Dual-task (DT) situations require additional control processes that actively schedule the sequence of task processing. These control processes rely on an order representation, the task-order set, that contains explicit information about the processing order of the component tasks and that is activated during DT processing. Evidence for this assumption stems from the observation that, in DT situations with a random task order, performance is usually improved in trials with a repeated (same-order trial) compared with a reversed (different-order trial) order of tasks relative to the preceding trial. In the current study, we tested whether performing only one of the two component tasks is sufficient to activate the task-order set. For this purpose, participants performed an auditory-visual DT with random task order while in some trials they only performed the first (Experiment 1) or the second (Experiment 2) component task. We found improved DT performance in same-order compared with different-order trials following trials in which only task 1 was performed. This performance benefit for same-order trials, however, was not observable after trials in which only task 2 was performed. This finding suggests that the processing of task 1 but not of task 2 is sufficient for the activation of the task-order set in DT situations.

Keywords: dual task, task-order coordination, executive control, PRP paradigm, multitasking
Presentation type: Poster Presentation
Session: Cognitive Control and Conflict II

Language balance and cognitive performance under bilingual irrelevant speech

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Today's work teams often consist of people speaking different languages. This can pose challenges as individuals may find themselves engaged in tasks in one language while being exposed to irrelevant speech in another. Previous research on bilingual language production has revealed that simultaneous processing of two languages – one relevant to the task and the other not – leads to cross-language interference. This project investigates the effects of exposure to irrelevant speech in one language on serial recall task performance in another language, and on the subsequent access and use of the language, which was present in the auditory background. To this end, the study initially assesses the language proficiency of German-English bilingual participants in their second language (L2; English). Participants are then asked to perform a visually presented serial recall task in their first language (L1; German) while being exposed to irrelevant speech in either L1 or L2. Following this, participants' proficiency in L2 is measured once again. The project aims to examine two key factors: (a) participants' performance in serial recall when exposed to irrelevant speech in L1 versus L2, and (b) shifts in L2 proficiency before and after exposure to irrelevant speech in L2. The resulting data will enable testing for differences between L1 und L2 background speech, thus potentially refining the theoretical foundations of the irrelevant speech effect. Additionally, it will shed light on the processes through which bilingual speakers dynamically adapt their language balance within a given context.

Keywords: Irrelevant Speech Effect, Bilingualism, Language Control, Speech Production
Presentation type: Poster Presentation
Session: Language

Comparison of light-based cues after a take-over request in automated driving

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SAE Level 3 automated driving requires the driver to switch from a non-driving task, such as playing with a tablet, to driving in a short period of time before a system limit is reached. If the drivers do not have a sufficient situation awareness at the take-over, this may be a safety risk. In previous studies, drivers have shown inadequate gaze behaviour after the take-over. A system-induced guidance of the gaze behaviour might help to improve perception and thus lead to increased situational awareness and safety. To find out the best way to guide the gaze a 4x2 within-subject experiment was conducted. Four variants of light cues were compared. After each take-over request the light cues occurred in four different areas (rear mirror, side mirror, Head-Up Display on the street, speedometer). Two orders of light cues were compared. The different light cues were developed based on attention attracting features such as size, movement and blinking. Usability ratings, driving behaviour and gaze behaviour were measured for N = 26 participants. After the participant has experienced all combinations of variants and orders of light cues, a post-session interview was conducted. Preliminary results indicate superiority of one variant. Especially during the post-session interview, the advantages of a blinking light cue were highlighted. Future studies will investigate the effect on situation awareness directly by using the SAGAT.

Keywords:
Presentation type: Oral presentation / Talk
Session: Traffic Psychology II: Perceptual aspects

Do Prospective Memory and Working Memory Share a Common Processes? Evidence From a Color Matching Task

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Prospective memory defines the ability to remember and carry out intended actions in the future. Working memory is used to temporarily hold and manipulate information. There is indirect evidence that prospective memory and working memory share cognitive processes. However, direct evidence for this assumption is largely missing. Hence, it was our primary goal to provide more direct evidence by means of a dual task approach that prospective memory and working memory share cognitive processes. Working memory was tested with a delayed estimation task. The task required participants to memorize colored objects, which color had to be reproduced during recall. After measuring baseline performance with the delayed estimation task, participants received the prospective memory instructions to disregard the displayed color of an object if it belonged to a specific category, such as animals, and to reproduce a particular shown color, such as a specific tone of red. After a retention interval with an unrelated filler activity, participants were required to again conduct the delayed estimation task, this time with the embedded prospective memory cues. Participants completed three conditions with increasing working memory loads, each consisting of a baseline and a prospective memory block. Preliminary results showed reduced precision in color recall in prospective memory blocks in comparison to baseline blocks. The difference in color recall between prospective memory block and baseline block increased with increasing working memory loads. In line with previous research, we conclude that working memory and prospective memory share common cognitive processes.

Keywords: Prospecive memory, working memory, memory, color, cognition
Presentation type: Poster Presentation
Session: Memory and Learning II

"Ick bin een Berlina": Dialect proficiency impacts a robot's trustworthiness and competence evaluation

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Background: Robots are increasingly used as interaction partners with humans. Social robots are designed to follow expected behavioral norms when engaging with humans and are available with different voices and even accents. Some studies suggest that people prefer robots to speak in the user's dialect, while others indicate a preference for different dialects.
Methods: Our study examined the impact of the Berlin dialect on perceived trustworthiness and competence of a robot. One hundred and twenty German native speakers (M_{age} = 32 years, SD = 12 years) watched an online video featuring a NAO robot speaking either in Berlin dialect or standard German and assessed its trustworthiness and competence.
Results: We found a positive relationship between participants' self-reported Berlin dialect proficiency and trustworthiness in the dialect-speaking robot. Only when controlled for demographic factors, there was a positive association between participants' dialect proficiency, dialect performance and their assessment of robot's competence for the standard German-speaking robot. Participants' age, gender, length of residency in Berlin, and device used to respond also influenced assessments. Finally, the robot's competence positively predicted its trustworthiness.
Discussion: Our results inform the design of social robots and emphasize the importance of device control in online experiments.
Keywords: competence, dialect, human-robot interaction, robot voice, social robot, trust
Presentation type: Oral presentation / Talk
Session: Artificial Intelligence

Can the serial reaction time task reduce change blindness?

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Change Blindness is the relativ inability to detect changes when they are masked by a global transient (Simons, 2000). Many studies found that change blindness can be reduced if attention can be allocated to the position of the change (Hollingworth, Schrock, et al., 2001). One possibility to draw attention to the location of the change is to enable participants to anticipate the location of the upcoming change. A paradigm which allows participants to prepare for the next reaction is the serial reaction task (SRT, Nissen & Bullemer, 1987). In the SRT participants are presented with successive stimuli and have to react to them. Unbeknownst to the participants the stimuli are following a sequence. Classically, this sequence will be learned by the participants implicitly and/or explicitly. If learned, the sequential presentation allows to prepare for the next stimulus and thus faster reactions and fewer errors. It should therefore be possible to combine the SRT with change blindness paradigm to increase change detection. To this end, the change positions in the present change blindness paradigm will follow a sequence. Two experimental groups will participate. One group in a classic one shot flicker paradigm with a 250ms blank between pre- and post-change scene (change blindness group) and one group with a 10ms blank to check if learning can take place in the experimental design at all (control group). If the change position sequence is learned, participants should be able to allocate attention to the next change position and thus decrease change blindness.

Keywords: implicit learning, serial reaction time task, change blindness, attention
Presentation type: No-Data Poster
Session: Attention

Neural underpinnings of effort evaluation and allocation

Nanne Kukkonen, Senne Braem, Joshua O. Eayrs, Stefania Mattioni, Mengqiao Chai, Tabitha S. Steendam, Ruth Krebs
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Mental effort is often conceptualised as a decision-making problem: the inherent cost of effort is weighed against the incentives to expend effort. In most paradigms, effort evaluation is not separated from the preparation where the negative signals of effort evaluation are translated into positive signals of effort allocation to ensure successful task performance. For example, in effort and reward cuing studies, a high task demand can lead to an upregulation of effort, as indexed by the recruitment of neural structures underlying effortful control, especially when rewards are expected. In an fMRI study (n = 40), we explored effort as a dynamic process involving both evaluation of reward and effort information, and allocation of resources based on this information. Participants completed a cued cognitive control task in which incentive level and demand level were combined in a factorial manner. A trial began with an 'evaluation cue' that informed the participants of the condition, prompting evaluative processing of the upcoming effort condition. This cue was succeeded by an 'allocation cue', which served to signal the preparation phase for the upcoming task. Neural activity was assessed during the evaluation phase and the allocation phase in predefined regions of interest. These regions, typically implicated in motivated effort paradigms, supported demand-related processing in the evaluation phase, while encoding reward information in the allocation phase. By conceptualising effort as a multi-stage, dynamic process, we were able to tease apart different stages and neural signatures of mental effort in evaluative and attentional control networks.

Keywords: effort, motivation, fMRI, control
Presentation type: Oral presentation / Talk
Session: Affect, motivation and control I

Controlling response order without relying on stimulus order – Evidence for flexible representations of task order

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In dual-task situations, component tasks are typically not executed simultaneously but rather one after another. Response order is usually determined based on bottom-up information provided by the stimulus sequence, but also affected by top-down factors such as instructions and/or preferences for certain response orders over others (e.g., oculomotor task prioritization). Recent research demonstrated that in the context of a randomly switching stimulus order, task order can be represented in an integrated manner with component task information rather than in a purely abstract fashion (i.e., by containing only generic order information). This conclusion was derived from observing consistently smaller task-order switch costs for a preferred (e.g., oculomotor-manual) versus non-preferred (e.g., manual-oculomotor) task order. Here, we investigated task-order representations in situations without any bottom-up influence of stimulus order by presenting task stimuli simultaneously and by cuing the required task-order in advance. Experiment 1 employed maximally abstract order cues that only indicated a task-order repetition (vs. switch) relative to the previous trial, while Experiment 2 used explicit task-order cues. Experiment 1 revealed significant task-order switch costs only for the response that was executed second and no task-order switch cost asymmetries between the preferred and non-preferred task orders indicating an abstract representation of task order. Experiment 2 revealed task-order switch costs in both component tasks with a tendency toward smaller costs for switching to the preferred (vs. non-preferred) task-order indicating an integration of component task information into task order representations. These findings highlight an astonishing flexibility of mental task order representations.

Keywords: dual-task performance, task-order control, cognitive control
Presentation type: Oral presentation / Talk
Session: Changes for learning: how do changes in task-specific representations shape adaptive cognitive control?

In the Eyes of the Listener: The Interplay of Gaze Behavior and Emotional Context in Conversations

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During conversations, we often interpret our interaction partner's gaze to gauge their level of interest, understanding and empathy towards our utterances. The present study investigated which gaze behaviors are evaluated favorably in a listener – depending on the emotional character of the conversation – and whether listeners actually display this 'optimal' gaze behavior in naturalistic conversation settings. To gain a comprehensive understanding, we included different emotional contexts (e.g., sad, happy) and different aspects of gaze behavior such as direct gaze, frequency of gaze aversion, etc. We conducted several experiments, first maintaining high experimental control by presenting pre-recorded videos of individuals listening to brief autobiographical narrations. The participants evaluated the listener's gaze behavior on different dimensions (e.g., empathy). We then moved to dyadic face-to-face interactions in a laboratory setting, where we recorded participants' own gaze behavior during conversations with a confederate. Our findings underscore the critical influence of contextual factors on what constitutes appropriate gaze behavior in a listener and provide valuable insights into the dynamics of gaze behavior in everyday social interactions.

Keywords: direct gaze, emotional context, gaze behavior, social cognition, social interaction
Presentation type: Oral presentation / Talk
Session: Harnessing Gaze - Eyes for Information, Communication, and Understanding

Visual Search and Intrinsic Interests

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The study investigates the role of intrinsic interests in visual search. For instance, agreeableness and conscientiousness that show women's interest in harmony can lead to prolonged search with a long reaction time ‘tail’ (Shahar et al., 2014) especially in no-target trials (Lange-Küttner & Puiu, 2021). Likewise, in visual search using a football pitch where one target player was in an offside position, or not, girls with less game experience were also less likely to show successful identification (Lange-Küttner & Bosco, 2016). This study tested boys and girls at 9 and 12 years who were intrinsically interested in reading books in a library and compared them with football club members. The library group was better in identifying no-offside trials (saying no) but this bias had disappeared at 12 years of age. The football group was better in identifying the target player in the offside position at 12 years of age. Thus, interest in the game still exerted a significant influence on the offside visual search task.

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Keywords: Visual Search, Intrinsic Interests
Presentation type: Poster Presentation
Session: Attention

Investigating preparatory cognitive control during motivational-affective task switching: a study with EEG

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While task switching has been used thoroughly to study cognitive control the interplay with motivational-affective (ma) task content remains unclear. Facilitated processing of ma task information may improve the activation of ma task-sets, and increase switch costs for the ma task. Previous investigations demonstrated that more dominant task sets experience larger switch costs, as they require active inhibition during the performance of the less dominant task. A corresponding logic was applied to the ma domain.
The current study investigated the temporal dynamics of cognitive control by measuring electrophysiological correlates of task preparation during a cued ma task-switching.
While undergoing an electroencephalographic recording participants performed a cued task switching, repeating, or switching between tasks. The compound stimulus of a digit superimposed on a food stimulus required either to categorize the digit as odd or even (neutral-task) while the food stimulus had to be categorized as either sweet or salty (ma-task).
Behavioral results were in line with the affective dominance hypothesis. The switch costs were increased for the ma task compared to the neutral task. This indicates that the ma task was more dominant requiring inhibition to perform the neutral task.
During the cue-stimulus interval, the switch positivity (sp) at parietal sites was increased for the neutral task, compared to the ma task. Thus larger switch costs were associated with a lower sp. As the sp indicates task-set reconfiguration such a finding could reflect a hampered task-set reconfiguration of the ma task-set due to inhibition.
Keywords: Cognitive Control Motivational-Affective Switch Positivity Task Switching
Presentation type: Oral presentation / Talk
Session: Affect, motivation and control II

Psychological privacy: public self-awareness lowers information disclosure

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Psychological privacy is the idea that visual cues may influence perceptual processes to evoke a sense of being in a private space or being in a public area. We conducted two experiments to investigate this. Participants answered questions varying in sensitivity and rated the extent the answers would be disclosed. In Experiment 1 (N = 74), we displayed eye cues that watched the participants or watched the input area, or showed no eye cues while participants completed the questions. Participants who did not report feeling watched by the cues disclosed less information when the eyes were watching the input area than when no eye cues were shown. This indicated that observing the input area while data is entered could shift how much information is disclosed. In Experiment 2 (N = 130), the experimenters watched either the participants or the input area while participants completed the questions. Those who scored high on the public self-awareness scale gave low disclosure scores to answers for sensitive questions. Being observed by the experimenters did not affect information disclosure. Taken together, the data suggests that the individual's sense of public awareness plays a role in guiding whether information would be disclosed. This means that visual cues that elicit a sense of public awareness could induce greater vigilance for information sharing.

Keywords: privacy, information disclosure, self awareness, public, information sharing
Presentation type: Poster Presentation
Session: Human Factors II

Straight from the Horse's Mouth: Participants' Thoughts, Strategies and Emotional Experiences during the Continuous Color-Report and the Change Detection Task

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Previous research has shown that when measuring visual working memory (VWM) using the continuous color-report task (CCRT), emotions occur incidentally, i.e. the task itself triggers positive and negative emotions in participants (Laybourn et al., 2021). These emotions are linked to VWM performance, suggesting that they are potential confounding variables. The aims of the following two studies were (1) to further explore what participants feel and think during the CCRT in order to identify other factors, which may be tied to VWM performance, and (2) to ascertain whether these findings translate to different VWM capacity measures, such as the change detection task (CDT). In two studies (N = 19, respectively), participants were required to think aloud, i.e. verbalize any thoughts and feelings they were having while completing a VWM task (study 1: CCRT; study 2: CDT). Qualitative content analysis revealed that participants in both studies experienced different task-related emotions, such as achievement and epistemic emotions, and that these emotions were triggered by different aspects of the task (e.g. fixation cross) as well as by personal factors (e.g. achievement goals). Further, participants hinted towards using different strategies (e.g. grouping) in order to enhance their performance on the task. Additionally, some participants reported a certain degree of mind-wandering during the task. Our findings provide novel insights into VWM research purely from the participants' perspective and suggest that there are many factors which need to be further investigated as potential confounding variables when measuring VWM using different VWM measurement paradigms.

Keywords: working memory, capacity measures, task emotions
Presentation type: Poster Presentation
Session: Memory and Learning III

Hierarchical Extension of the Brunswik Lens Model in the Context of Metamemory Judgments

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In metamemory research, people are often asked to judge the probability of recalling a studied item in a subsequent test. These judgments of learning (JOL) are assumed to be inferred from probabilistic cues that are to some extent predictive of actual recall performance. Based on Brunswik's lens model, the matching between the cues used to make a judgment and their respective validities can be quantified by the matching parameter G, which is computed for each person separately by correlating the predicted values from two linear regressions (one for the judgments, one for the actual recall performance) using the cues as predictors. However, this computation of person-wise regressions does not account for the clustered structure of the data. In addition, Undorf & Bröder (2019) found that there is substantial systematic covariation between JOLs and recall which is not accounted for by the matching parameter G. Both issues could potentially lead to inaccurate estimations of G. Therefore, a hierarchical extension is proposed and compared to the conventional approach in a simulation study and in the reanalysis of five JOL datasets. The simulation study revealed that the G parameter of the hierarchical approach more accurately recovered the true matching than the participant-wise analysis, especially when item-effects or omitted cues affected the data. In the application, however, the differences in G were mainly due to hierarchical shrinkage, suggesting that the classical lens model application causes overfitting and, therefore, underestimation of matching. The findings indicate that people's metamemory ability is higher than previously assumed.

Keywords: metamemory, hierarchical modeling, judgments of learning, brunswik lens model, lens model equation, methods
Presentation type: Oral presentation / Talk
Session: Metacognition and Problem Solving

Two memory routes for learning words? Effects of prior knowledge on source memory during L2 word learning

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Previous research has shown that experiences that match a learner's prior knowledge ('schemas') are not only better retained, but may even use a different memory route than those unconnected to prior knowledge. In particular, such 'schema-consistent' content might be learned with less episodic memory involvement, and be instead encoded directly into semantic memory. We tested this claim for word learning in a new language. Dutch participants learned words in Mandarin (Exp. 1), Italian (Exp. 2) or Swedish (Exp. 3). The degree and kind of relevant prior knowledge varied across all three experiments. In Exp. 1, the words' phonemes either also existed in the participants' native language Dutch or not. In Exp. 2 and 3, words were either cognates (i.e. overlapping in form and meaning) with Dutch or not, with varying degrees of predictability of the cognate form given the Dutch word. As an established indicator of episodic memory involvement, we asked participants to indicate the voice (male / female) by which a word had been spoken during learning (*source memory*). The results of the first two experiments showed, first, that schema-consistent items (cognates, or phonetically 'easy' words) were recalled better than inconsistent ones. Critically, though, source memory followed the same pattern, contrary to what the 'schema' account predicts, and more in line with a competing view that stresses the role of attentional resources. The data for Exp. 3, in which the 'schema' is implemented in its strongest form, is currently being collected and will be included.

Keywords: source memory, word learning, foreign language, episodic memory
Presentation type: Oral presentation / Talk
Session: The Impact of Language Experience on Learning and Memory

The Joint Simon Effect in Human-Computer interactions

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The employ of different technologies has been constantly increasing in our daily life. From chatbots to automated cars, it is becoming normal to interact with some sort of technology and the functional relationship with it is essential to cover certain needs and expectations. The Sense of Agency (SoA) seems to play an important role in social interactions to facilitate the involvement in group tasks. In this way, the perceived involvement of a non-human agent would be sufficient to develop a cooperative environment between humans and computers. In order to understand this phenomena, the joint Go/NoGo tasks are commonly employed to investigate the perceptions of the individuals while performing the task together. The present research aimed to study the interactions while individuals perform a Go/NoGo task with a partner and, together with subjective ratings, determine whether the computer partner is perceived as similar to human partners; and, second, to explore to which extent the performance in the task differs between human partners and computer partners.

Keywords: Go/NoGo task; Sense of Agency; Joint Action; Human-computer interaction
Presentation type: Oral presentation / Talk
Session: Joint Action

Finding some consistency in inconsistent age effects in speed of information accumulation: task difficulty serves as moderator

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Age studies have shown that older individuals often have prolonged response times compared to younger individuals, whereas their accuracy rates differ only rarely. Diffusion model analyses aimed at examining the reasons underlying these findings and have revealed a consistent pattern in terms of two parameters: Older individuals have higher threshold separations (i.e., they are more conservative in their decisions) and prolonged nondecision times (i.e., they need more time for stimulus encoding or motor processes). Regarding drift rate, which is a measure of speed of information accumulation, the results of these previous diffusion model studies are, however, inconsistent. In some studies, younger individuals outperformed older individuals in terms of drift rate; in other studies, there was no difference between age groups or even a reversed pattern. In our study, we identified one moderator that seems to at least partly explain these inconsistent findings. We had 30 young participants (< 37 years) and 30 older participants (> 60 years) work on six typical response time tasks and varied task difficulty within each task. As expected, we found the typical age differences in threshold separation and nondecision time. Moreover, for drift rate, a consistent age by task difficulty interaction emerged: Even if younger individuals were superior to older individuals in terms of speed of information processing in almost all tasks, this effect was clearly smaller for the more difficult stimuli. Thus, older individuals profited from an increase in task difficulty.

Keywords: diffusion modeling, age differences
Presentation type: Oral presentation / Talk
Session: Computational modeling in experimental psychology: Linking model-based and processtracing analyses

Preparatory templates for anchor-guided search in object-selective cortex

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Efficient behavior requires the rapid attentional selection of task-relevant objects. Previous research has shown that target-selective neurons in visual cortex increase their baseline firing rate when participants are cued to search for an object. Such preparatory activity represents a key finding for theories of visual search, as it may reflect a top-down bias that guides spatial attention, favoring processing of target-matching input for subsequent report. However, in daily life, visual search is often guided by non-target objects that are neither externally cued nor reported. For instance, when looking for a pen, we direct our attention to the office desk where we expect the pen to be. So-called anchor objects (e.g., the desk) thereby guide search for associated objects (e.g., the pen) in scenes.
Here, we used fMRI and eye tracking to test whether preparatory activity represents the externally cued target (the pen) or the internally generated anchor object (the desk). In an anchor-guided search task, participants (N=34) learned associations between targets and anchors and searched for these targets in 3D rendered scenes. To fully dissociate target from anchor processing, target-anchor associations reversed across scene contexts. Participants' first fixations were reliably guided towards the target-associated anchor. Importantly, preparatory fMRI activity patterns in object-selective cortex represented the target-associated anchor rather than the target. Whole-brain analyses additionally identified a region in the right intraparietal sulcus that similarly represented the anchor. Our results show preparatory activity represents a self-generated guiding template, not necessarily the cued target, contributing to the efficiency of visual search.

Keywords: preparatory activity, visual search, anchor objects, attentional template, naturalistic search
Presentation type: Oral presentation / Talk
Session: Cognitive and Neural Processes Underlying the Perception of Actions, Scenes and Objects I

Will a flamingo regain its pink with distance? How distance affects the representational format

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Mental representations have been shown to be influenced by distance. While someone likely represents a nearby target in an egocentric and concise way, mental representations tend to be more abstract at a distant recollection point. This effect applies to temporal and psychological distance as well.
Adding to the usually binary design of existing studies, we will explore whether a scaling effect of distance exists in memory representations. We are especially interested in how the representational format is affected over increasing distances.
For higher control and easier comparison between experimental results, our experiments will be in a virtual environment. Our setup will have a central room with testing locations in connected rooms which differ in their distance to the target. After exploration, participants will be tested on their memory of target locations and objects. Our first goal is to observe the effect of increasing spatial distance on spatial representations. Expanding upon spatial distance we plan to include psychological distance in the subsequent experiment. Varying room sizes, we plan to have testing locations that are equal in spatial distance but differ in psychological distance. In another follow-up experiment, we will substitute spatial distance with perceived temporal distance, simulating different timespans before testing. In the follow-up experiments we will test for object recognition, asking participants on the colour of an unusually coloured target object or to recreate its form.
We expect representations to be less detailed with increasing distance, and to be gradually replaced with more prototypical concepts of the target.

Keywords: Representation, Memory, Virtual Environments
Presentation type: No-Data Poster
Session: Memory and Learning III

Visual Numerosities Activate the Mental Number Line in Adults

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Neonates and animals attend to left and right space when seeing few or many dots, respectively. This phenomenon is also known as spatial numerical association of response codes (SNARC) effect. A biological hypothesis proposed that spatial–numerical associations depend on the brain's asymmetric frequency tuning with visual properties (Felisatti et al., 2020). Does the visual representation of dots alone activate spatial mapping without conceptual number representation? Two groups of Chinese adults separately completed an explicit and an implicit task. In the explicit task, 33 participants distinguished between 'few' dots or 'many' dots, using 'left' and 'right' labeled keys. In the implicit task, 34 participants distinguished 'clear' from 'not clear' patterns using the 'D' and 'K' keys, thereby avoiding activation of number and space concepts. Classification speed was analyzed. Both tasks revealed SNARC, suggesting that visual numerosities alone activate spatial-numerical associations. SNARC was reversed, perhaps reflecting strong right-anchoring of cultural practices in Chinese (e.g., counting: Shaki & Fischer, 2023).

Reference:
Felisatti, A., Laubrock, J., Shaki, S., & Fischer, M. H. (2020). A biological foundation for spatial–numerical associations: The brain's asymmetric frequency tuning. Annals of the New York Academy
of Sciences, 1477(1), 44–53.
Shaki, S., & Fischer, M. H. (2023). How do numbers shift spatial attention? Both processing depth and counting habits matter. Journal of Experimental Psychology: General. Advance online publication. https://doi.org/10.1037/xge0001493

Keywords: spatial cognition, numerical cognition, visual perception, numerosity, SNARC
Presentation type: Oral presentation / Talk
Session: Numerical Cognition / Crossmodal Perception

Optimizing the Speed-Accuracy Trade-Offs: Analyzing the Strategies Behind Fiedler et al. (2021)

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Humans often face a dilemma when making a decision: they can either make the decision quickly but inaccurately or accurately but slowly. How do humans decide when to stop accumulating information and make the decision? Many studies have found that participants tended to maximize the reward rate, i.e., the ratio between accuracy and time spent on the task. Hence, the participants seemed to stop to maximize the reward rate. In this study, I tried to identify the participants' strategies to maximize their reward rate by implementing the common strategies as computational models. I then reanalyzed the data collected by Fiedler et al. (2021) and compared the fitness between strategies. In their experiments, the participants were presented with two stocks with different probabilities of rising or falling and asked to select the better stock. The outcome of the stocks was sampled for the participants gradually, and the participants could decide when to stop sampling and make a decision. The participants were incentivized to make as many correct decisions as possible but were only given a fixed amount of time for the task. Thus, they were encouraged to maximize the reward rate. By comparing the strategies, I found that half of the participants approached the task with an evidence accumulator strategy. Each sample accumulates evidence toward one of the two boundaries, and the decision is made whenever a boundary is reached. The rest of the participants used strategies akin to likelihood estimation or counting the number of different outcomes between stocks.

Keywords: decision making, speed-accuracy trade-off, computational modeling
Presentation type: Oral presentation / Talk
Session: Decision Making I

How induced controllability affects climate change risk perception and learned helplessness

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Climate change is one of the most pressing challenges for humanity in this century. Communicating in a way that raises awareness of the risk climate changes poses while at the same time not inducing negative feelings, like helplessness, is a challenge. On one hand research has shown that emphasizing the severity of climate change is related to higher risk perception, which could lead to more pro-environmental behavior. On the other hand, it could trigger higher helplessness which is associated with lower motivation to act climate friendly. Previous research showed that controllability leads to lower risk perception and lower levels of learned helplessness. To our knowledge there is no research investigating the direct impact of controllability in the context of climate change. Thus, we conducted an experiment with N = 220 participants to examine the influence of controllability on risk perception and learned helplessness in the context of climate change. Participants received six climate change scenarios that differed only in induced controllability. There were four conditions: In the high controllability conditions participants received the information that climate change could be influenced by the government or oneself. In the low controllability conditions participants received the information that the impact of climate change, for example the amount of deforestation on CO2 emissions, is not reversible. Results showed that in all conditions risk perception increased but only in the conditions with high controllability learned helplessness decreased. Taken together, our results emphasize the importance of including solutions when addressing the negative impacts of climate change.
Keywords: climate change, controllability, learned helplessness, risk perception
Presentation type: Poster Presentation
Session: Human Factors I

Similarities between the perception of direct gaze and direct pointing

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Gazing and pointing can have overlapping functions in social interaction. The perception of both social cues is remarkable precise. Nevertheless, the perception of direct gaze is characterized by an area of direct gaze rather than one single gaze direction. In fact, observers accept a range of gaze directions as direct. Here we investigate if there is an analogous area of direct pointing. Three experiments examine an area of direct pointing (about 5 – 9°) and compare it to the area of direct gaze. We find this area to be similar, but not equal, in shape and size. Furthermore, we examine the influence of different pointing gestures on the area of direct pointing. Results indicate a shift of the area of direct pointing in direction of the shown hand and forearm (left or right). The results are discussed with respect to common underlying mechanisms of the perception of direct gaze and direct pointing.
Keywords: direct gaze, direct pointing, gaze perception, pointing perception
Presentation type: Poster Presentation
Session: Interaction and Social Psychology

Is the α-parameter of the Lévy-flight model reflective of guessing?

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According to the diffusion model (Ratcliff, 1978), binary decisions stem from a process of continuous evidence accumulation with normally distributed noise. The Lévy-flight model (Voss et al., 2019) extends the diffusion model by the parameter α which further specifies the noise distribution: The lower the value of α, the heavier are the tails of the noise distribution, and the more prevalent are sudden large changes (i.e., jumps) in evidence accumulation. While α can enable a superior fit to the data, its psychological meaning remains empirically underexplored. This study examines whether α reflects guessing, predicting a decrease in α-values as individuals are encouraged to guess. Using a brightness-discrimination task, we employed three conditions that varied in the extent to which guessing was promoted. In the deadline condition, there was a response deadline of 900 ms and instructions stressed accurate responding. In the deadline gut feeling condition, we used the same deadline but instructed participants to follow their gut feeling when in doubt. In the control condition, participants had unlimited time to respond and were instructed to respond as fast and as accurately as possible. As expected, in the presence compared to the absence of a deadline, α-values were significantly smaller. However, the difference in α between the two deadline conditions did not reach statistical significance, likely due to the high difficulty of the employed task alongside the strict deadline. Accordingly, we advocate for and delineate further inquiries of possible interpretations of α, particularly regarding guessing.

Keywords: Lévy-flight model, diffusion model, decision-making, guessing
Presentation type: Poster Presentation
Session: Decision Making

Connecting the sample size of mental sampling with working memory capacity

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The sampling framework offers an integrative perspective on how people make probability judgments, proposing that they approximate probabilities by sampling instances from memory or through simulation (Costello & Watts, 2014). Although sampling-based models have reproduced various effects in probability judgments, criticism has emerged regarding the lack of connections between model terms and psychological processes (Coenen et al., 2018). Addressing this critique, we tested the assumed positive association between a crucial model term—the sample size of mental sampling—and individual differences in working memory capacity (WMC), a widely assumed relation in the sampling framework (Lloyd et al., 2019). To assess this association, we used the coherence of participants' probability judgments as a proxy for sample size, reasoning that larger samples are less vulnerable to sampling variability. Adopting a novel event-ranking task, participants provided rankings for sets of events, each comprising two pairs of complementary events, {A, not-A, B, not-B}. A logically correct ranking adheres to the complement rule: when A is ranked above B, not-A should be ranked below not-B. The probabilities of participants providing logically correct rankings manifest the level of coherence in probability judgments. We found a positive association between WMC and coherence when participants ranked very likely or unlikely events but not when ranking events with probabilities close to 0.5. This interaction seems to align with predictions from our sampling-based model for the event ranking task, allowing for different interpretations. Our findings provide evidence for the assumed link between WMC and the sample size of mental sampling.

Keywords: Probability judgments, Mental sampling, Working memory
Presentation type: Oral presentation / Talk
Session: Working Memory

Modeling the structure of uncertainty perceptions: The roles of limited knowledge and random variation in perceived epistemic, aleatory, and general uncertainty

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When people make choices, they may face various forms of uncertainty: Aleatory uncertainty refers to stochastic variability in outcomes whereas epistemic uncertainty refers to a lack of knowledge of something that is, in principle, knowable. Although this distinction is commonly used, to date no study has systematically disentangled (1) whether people perceive these two forms of uncertainty differently, (2) whether their perceptions are independent or correlated, and (3) how the respective perceptions are associated with people's general perception of a situation's uncertainty. To answer these questions, we conduct an experiment with a 2 (epistemic uncertainty: low vs. high) x 2 (aleatory uncertainty: low vs. high) between-subjects design. We implement this with vignette-based scenarios and (incentivized) lottery tasks. As outcome measures, we assess participants' perception of epistemic, aleatory, and general uncertainty using both single-item measures, and the Epistemic Aleatory Rating Scale (Ülkümen et al., 2016) at multiple time points during the tasks. The data we collect allow us to model the relationship between different types of perceived uncertainty, and their change in reaction to increasing knowledge obtained during the lottery tasks. By explaining how an individual's perception of uncertainty changes as a function of the source and degree of uncertainty, we intend to make at least two contributions. First, we inform future research on how to investigate the distinct influence of types and perceptions of uncertainty on a decision maker's choices. Second, we aim to contribute to an old debate on how to distinguish ambiguity, uncertainty, risk, and different flavors thereof.

Keywords: Epistemic and aleatory uncertainty, risky choices, decision making
Presentation type: Oral presentation / Talk
Session: Decision Making II

Dysfunctional pain behavior and reward learning in subgroups of individuals with chronic pain

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Previous research suggest three subgroups of individuals with chronic pain differing in pain-related aspects: (1) Individuals in the *dysfunctional group* are characterized by a high amount of perceived pain, interference, and affective distress as well as reduced general activity and life control; (2) Individuals in the *interpersonally distressed group* report less social support and more punishing responses by significant others; (3) Individuals in the *adaptive copers group* are characterized by less perceived pain and interference as well as a high levels of life control. However, studies comparing the three subgroups with respect to important processes involved in the development and maintenance of chronic pain, such as dysfunctional pain behavior or altered reward learning are sparse. In this talk, I will emphasize the pain-related and psychosocial differences between the three subgroups. The focus will be on recent results from one of our own studies in which we investigated differences between the three subgroups in pain behavior during everyday movements and neural correlates of reward learning. A better understanding of the different processes underlying the development and maintenance of chronic pain in different subgroups of individuals with chronic pain may help to improve the management of chronic pain and enhance individualized therapies.
Keywords: chronic pain, reward learning
Presentation type: Oral presentation / Talk
Session: Psychological factors in chronic pain: Recent experimental results

Reliability of Visual and Auditory Processing Tasks in Dyslexia Research

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Findings on the cognitive causes of dyslexia are often inconsistent. We address the methodological issues that may contribute to this inconsistency. We assess the psychometric reliability of tasks widely used in perceptual theories of dyslexia. We will report data from our empirical investigation with 200 German native-speaking children in 3rd and 4th grades. Tasks include visual and auditory processing experiments, replicating previous studies: (1) rise time and frequency discrimination (Goswami et al., 2011, 2010), (2) auditory and visual temporal order judgement (Landerl & Willburger, 2010), (3) visual-spatial attention tasks (Bertoni et al., 2021), (4) coherent motion detection (Stein, 2014). In addition, we assess reading fluency and include control tasks (phonological awareness and simple and choice reaction time). Each participant undergoes two sessions — the first online (via Pavlovia.org), and the second either in the lab or online.

Preliminary data analysis, comprising 158 online and 77 in-lab datasets, reveals test-retest correlations of .34 to .45 for experimental tasks and .43 to .54 for control tasks. Recruitment continues to reach 200 datasets. We will present test-retest reliability, internal consistency, and psychometric functions of tasks. Additionally, we will investigate the association between perceptual task performance and reading ability, shedding light on the stability of effects reported in replicated studies. Insights into the feasibility of online dyslexia/reading studies with child participants will be also shared with the audience. Through discussions of methodological considerations, our goal is to enhance the reliability of dyslexia research and contribute to more coherent investigations of this complex disorder.

Keywords: reading, dyslexia, psychometrics, reliability, individual differences, visual processing, auditory processing
Presentation type: Oral presentation / Talk
Session: Language

Caught by Design? A Differentiated Perspective on Digital Decision Making Through the Influence of Deceptive Design Patterns

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In our digital world, many everyday decisions are made online. Internet platforms are increasingly using technologies that intend to influence the decision-making of users in the interests of the company, so-called deceptive design patterns (DDPs). These occur as misleading language, emotional influence or visual deception. The effect of single DDPs on decision-making has been well documented by various studies[1]. However, DDPs often occur in combination, frequently and repeatedly[2]. This raises the question to what extent digital decision-making is influenced by the DDP itself, the sequential order of specific patterns or the overall time spent on a website?
To answer this, we conducted an experiment in which subjects were instructed to visit a website without responding to non-task-related offers (e.g. newsletter subscription). These offers appeared as frequent pop-ups with various DDPs to urge people into unintended actions. We measured the error rate (accepting non-task related offers) depending on the specific DDP, the sequential order (congruent vs. incongruent pattern before), and the duration of the experiment. First results indicate that specific DDPs significantly increase or decrease the error rate compared to the control condition and are discussed in the light of theoretical assumptions on digital decision-making.

[1]European Commission (2022). Behavioural study on unfair commercial practices in the digital environment: Dark patterns and manipulative personalisation. Publications Office.
[2]Mathur, A., Acar, G., Friedman, M. J., Lucherini, E., Mayer, J., Chetty, M., & Narayanan, A. (2019). Dark Patterns at Scale. Proceedings of the ACM on HCI, 3(CSCW), 1–32.

Keywords: decision-making, digital transformation, deception, design patterns
Presentation type: Poster Presentation
Session: Decision Making

Transfer of control states between task switching and dual tasking

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Humans often process several tasks concurrently. Such multitasking can differ in whether one switches between different task sets (task switching, TS) or processes them simultaneously (dual tasking, DT).
The present study investigated the context-specificity vs. -generality of control states in multitasking, by testing whether control states implemented in one type of multitasking (i.e., TS) transfer to another (i.e., DT).
For this, we randomly interspersed single DT trials into TS blocks. Control states were established by manipulating the frequency of task switches between participants (Experiments 1 to 4). Frequent switches should increase the concurrent activation of both task sets in working memory, which should result in increased crosstalk in DT and easier shifts from Task 1 to Task 2 component processing. Frequent switches reduced switch costs (performance difference between switch and repetition trials) in TS, but did not affect DT performance.
In Experiment 5, control states were established by manipulating the proportion of response conflict in TS. Low conflict frequency should decrease task shielding (increased response congruency effect). These control states were successfully implemented in TS. Importantly, they transferred to DT: Response congruency effects in Task 1 as a marker of crosstalk were larger if TS featured many congruent than many incongruent stimuli.
To our knowledge, this is the first study to demonstrate that control adjustments can generalize across multitasking paradigms. That adjustments only transferred if induced by varied task conflict indicates that the level of processing at which control states are implemented determines whether control states are context-specific or -generic.

Keywords: Task switching, dual tasking, control states, transfer, conflict proportion, switch proportion
Presentation type: Oral presentation / Talk
Session: Multitasking and Cognitive Control II

Can transcutaneous auricular vagus nerve stimulation mitigate vigilance loss? Examining the effects of individualized vs. fixed stimulation intensities

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Vigilance is a challenging although imperatively necessary ability to maintain attention in many daily life and work activities. The arousal model of vigilance posits that physiological arousal is critical to regulate sustained attention, for which the locus coeruleus-norepinephrine (LC-NE) system would play a major contributing role. Recent research has proposed that transcutaneous auricular vagus nerve stimulation (taVNS) modulates indirect physiological markers of LC-NE activity, although its effects on vigilance have not yet been examined. Aiming to develop a safe and non-invasive procedure to prevent vigilance failures in prolonged tasks, the present study examined the possibility to mitigate vigilance loss by stimulating the LC-NE system via taVNS. Following a pre-registered protocol, 50 participants completed three randomized repeated-sessions in which either active taVNS at individualized intensity, active taVNS at fixed intensity (0.5 mA), or sham taVNS, was delivered while an attentional and vigilance task (i.e., ANTI-Vea) was completed. Before and after the task, saliva samples were collected to analyze indirect markers (i.e., alpha-amylase and cortisol concentrations) of LC-NE activity. Self-reports of feelings associated with stimulation and guessing rate of active/sham conditions supported the efficacy of the single-blind procedure. Contrary to our predictions, the observed vigilance decrement was not modulated by active taVNS. We discuss the role of changes in alpha-amylase and cortisol concentrations in the vigilance decrement and their validity as indirect markers of LC-NE activity. We highlight the relevance of replicating and extending the present outcomes, investigating further parameters of stimulation and its effects on other indirect markers of LC-NE activity.

Keywords: taVNS; locus coeruleus-norepinephrine; vigilance; attention; alpha-amylase; cortisol
Presentation type: Poster Presentation
Session: Attention

CANCELLED - Activating different mental representations of the calendar year in a SNARC task

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The SNARC effect (spatial-numerical association of response codes) indicates that sequences of numbers are represented in a mental line from left to right. The effect was also found for other domains including months. However, especially concerning the course of a year, other forms of representation are frequently reported and it remains unclear how common and stable these representations are. To examine whether these representations are prone to external influences we conducted a study involving three different priming-conditions that were presented before the actual task: a control group without a certain representation of the year, a task-compatible priming group with the months ordered in a timeline and a task-incompatible priming group with months ordered in a circle. The results suggest that the task-compatible priming can strengthen the SNARC effect, while it cannot be certainly said that a different priming condition can weaken the effect.
Keywords: SNARC, Activations Tasks, mental representation
Presentation type: Poster Presentation
Session: Cognitive Control and Conflict I

Activating different mental representations of the calendar year in a SNARC task

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The SNARC effect (spatial-numerical association of response codes) indicates that sequences of numbers are represented in a mental line from left to right. The effect was also found for other domains including months. However, especially concerning the course of a year, other forms of representation are frequently reported and it remains unclear how common and stable these representations are. To examine whether these representations are prone to external influences we conducted a study involving three different priming-conditions that were presented before the actual task: a control group without a certain representation of the year, a task-compatible priming group with the months ordered in a timeline and a task-incompatible priming group with months ordered in a circle. The results suggest that the task-compatible priming can strengthen the SNARC effect, while it cannot be certainly said that a different priming condition can weaken the effect.
Keywords: SNARC-effect, spatial representation, ordinal sequences, priming
Presentation type: Poster Presentation
Session:

On the fast lane - manipulated visual speed affects self-perception during cycling in virtual reality.

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Due to its endless design possibilities, virtual reality can be a useful tool in exercise psychology. Its captivating and dissociating properties contribute to its relevance, for instance, in exercise facilitation. Different avatar and scene designs can impact user experience and behavior substantially, making exercise more enjoyable or pleasant. During locomotive exercises like cycling, visual flow is a crucial sensory cue that conveys information about the actor's movement speed. A manipulation of the virtual movement speed may act on exercise experience and relevant aspects of self-perception, such as the sense of agency. To investigate the impact of visual flow speed during constant load cycling, sixty-six university sport students performed two ten-minute cycling bouts at a constant moderate intensity. A virtual cycling track was presented at either 50% or 150% of an individually assessed medium speed, respectively. Heart rate and subjective effort were measured throughout each trial. Faster visual flow speed was expected to evoke lower heart rates and ratings of subjective effort. Mixed linear model analyses revealed no significant effects of visual flow speed on both measures of effort. However, faster visual flow elicited greater senses of agency and presence. Further, slightly lower cadences were visible during faster visual flow. Although physical effort remained unaffected by visual flow speed, subjective reports indicate differences in the perception of both exercise bouts.

Keywords: visual flow, virtual reality, sense of agency
Presentation type: Poster Presentation
Session: Human Factors I

The Polarity Effect in Virtual Reality: Evidence for Faster Text Reading and Optotype Identification with Positive Display Polarity

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The polarity effect refers to a better performance in visual tasks when stimuli are presented dark on a light background (positive polarity) as compared with light on dark (negative polarity). Most studies examined polarity using conventional monitors for stimulus presentation. Only recently, research has been extended to virtual reality (VR). VR studies usually differ methodologically from traditional research, e.g. by using larger stimuli due to limited display resolutions, and focus on stimulus identifiability. Reaction times, which are crucial for VR applications that involve quick reactions to visual information, are understudied. We therefore used a high-resolution VR headset to experimentally test the polarity effect in VR with tasks and stimuli similar to traditional research, measuring both identifiability and reaction times. Based on previous research, we expected faster and more accurate reactions with positive polarity. In a one-factorial within-subject design, 27 participants reacted to 96 increasingly smaller Landolt-C optotypes via key-presses, and verbally indicated spelling and grammar errors in 18 texts. Half of the stimuli were presented in positive and half in negative polarity. Afterwards, experienced difficulties were surveyed.
As assumed, in positive polarity, correct reactions to optotypes were faster, and significantly more words were read and more errors identified. No significant effect in optotype identifiability occurred. Participants reported more blur in negative, yet more glare in positive polarity presentation, overall preferring negative polarity. The results suggest superiority of positive polarity in VR, especially when tasks require fast reactions, and a need for further research on discrepancies between subjective preferences and performance.

Keywords: Display Polarity, Polarity Effect, Virtual Reality, Human-Centered Computing, Display Design, Computer Graphics, Text Reading
Presentation type: Poster Presentation
Session: Human Factors II

Faster, but not finer: Prospect of reward in a dual task induces a bias toward action at the cost of accurate Task 2 performance

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Not responding to Task 2 can have adverse effects on Task 1 performance as demonstrated by no-go backward crosstalk effects (no-go BCE). Here, the response inhibition required to not respond to Task 2 spills over and adversely affects Task 1 performance. Over three experiments, we investigated whether the prospect of reward, which is a potent cognitive control modulator, influences the no-go BCE. In Experiment 1, reward was modulated as a within-subject, and in Experiments 2 and 3, as a between-subject factor. The results revealed three major insights: In all three experiments, reward led to faster Task 1 and Task 2 performance. Secondly, despite this speeding, the no-go BCE was not modulated by reward, and finally, reward led to more errors in Task 2 no-go trials. These results reveal a reward-induced bias for action over inaction. Furthermore, the findings contribute to the ongoing literature of the interplay between reward and cognitive control and shed light on the potentials and limitations of reward-based modulation of dual-task interference.

Keywords: Backward crosstalk effects, Response inhibition, Reward, Go/No-go, Dual task
Presentation type: Oral presentation / Talk
Session: Affect, motivation and control I

Getting a Grip on Grasping: Intuitive Physics, Multi-digit Dynamics, and Mixed Reality

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Grasping is not just a fundamental way in which we interact with objects. It is also a key behaviour that allows us to discover the physical laws governing our environment. An example is how we handle torque, the tendency of objects to rotate when picked up under gravity. While a simple heuristic to prevent objects from twisting out of our grasp is to minimize the distance to the object's centre of mass, here we present a study in which we demonstrate that human participants have much more nuanced sensorimotor understanding of how torque can be counteracted at our fingertips. Participants grasped L-shaped objects at various orientations while we tracked their fingertip movements. Stimuli were light-weight (wood, 70g) or heavy (wood/brass composite, 550g), designed to create grips with varying levels of torque. Depending on the object's orientation, participants either aligned their fingers to counteract torque through rotational friction or offset their fingertips to generate effective force couples ($p<.001$). These behaviours were further modulated by object mass, with heavier objects eliciting larger offsets ($p<.001$). These patterns were observable before the hand reached the object, demonstrating that these behaviours were visually-driven and predictive. Our findings thus suggest that humans leverage complex visually-based predictions of physical behaviours when selecting how to manipulate objects. Given recent methodological advancements, we are now poised to explore these processes for more complex, multi-digit actions in both natural and mixed-reality environments, deepening our understanding of the sophisticated interplay between perception, cognition, and motor control in grasping and object manipulation.

Keywords: grasping, intuitive physics, torque, material
Presentation type: Oral presentation / Talk
Session: Seeing, Thinking, and Acting in a Physical World

Multinomial models for measuring cognitive processes in paired-associate learning: Extensions and applications to the testing effect

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We extend an existing family of multinomial processing-tree (MPT) models for measuring cognitive processes in paired-associate learning to test-based learning and delayed memory testing. One paradigm that combines both aspects is the testing-effect paradigm: After studying a list of item pairs, participants restudy the same pairs (restudy group) or receive an initial cued-recall test without feedback (test group). At the end, participants complete a delayed final memory test, in which the test group typically outperforms the restudy group—a finding known as the *testing effect* (also *retrieval-practice effect*). Despite the wealth of research on this effect, its underlying mechanisms are still debated. Previous research has focused on single mechanisms and rarely aimed at dissociating memory processes that may contribute to it. To simplify the theoretical debate, the new family of MPT models disentangles the contributions of encoding, maintenance, and retrieval processes. This requires nothing more than (a) extending the final memory test to a free-recall test followed by a cued-recall test and (b) administering the final tests immediately versus after a delay. By applying various model versions to such data, it is shown that testing primarily creates maintenance benefits (e.g., resistance against forgetting), while the final retrievability of stored associations is not affected by testing versus restudying. The findings thus support maintenance accounts of the testing effect and challenge explanations assuming different accessibilities for initially tested versus restudied material at final recall. The new MPT model family can readily be applied to other test-based learning or delayed-testing paradigms.

Keywords: testing effect, retrieval practice, long-term memory, episodic memory, paired-associate learning, modeling, measurement models
Presentation type: Oral presentation / Talk
Session: Enhancing Learning and Memory

Measurement of gaze using smartphones, an applied consumer research case study of social media ad perception patterns in the US.

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eye square GmbH

Over the past two decades, there have been significant advancements in the hardware required for collecting high-quality eye tracking data. Although webcam-based algorithms for measuring gaze are widely used in the commercial market, the utilization of smartphone-based eye tracking is still at an early stage of development.
In this study, we aim to present one of the first case studies that showcases the application of a novel app-based recording paradigm created by Oculid, a Berlin-based company recently acquired by Tobii.What sets this app-based recording paradigm apart is its minimal technical requirements, makings it an ideal tool for conducting gaze recordings in experimental settings with limited access to advanced eye tracking equipment.
The case study examines user behavior on three prominent video platforms: Facebook, Instagram, and YouTube. The study was conducted in the United States, involving over 200 participants who utilized their personal smartphones. The participants were asked to explore simulated social media feeds and watch videos.
This study reveals significant variations in the viewing duration of integrated ads across different platforms. Specifically, newsfeed-based social media platforms exhibit shorter viewing times compared to YouTube. Moreover, an interesting finding is that increased attention does not necessarily result in improved ad effectiveness.Despite YouTube users having longer gaze durations, Instagram users show higher recognition rates for the ads.
These findings highlight the importance of distinguishing between voluntary and involuntary attention. The study suggests that voluntary attention is more effective in translating gaze into brand outcomes than involuntary attention.

Keywords:
Presentation type: Oral presentation / Talk
Session: Harnessing Gaze - Eyes for Information, Communication, and Understanding

Openness to experience and happiness: The mediating role of engagement and interest in the arts

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Although the importance of personality in our happiness is well-established, prior research has tended to focus either on neuroticism or on extraversion. And as such, other traits of potential interest have tended to be neglected. In this study, we focused on openness to experience, a previously less well-investigated trait, and its relation to subjective well-being (SWB). To be specific, using data from the GESIS Panel ($N = 874$), we examined the hypothesis that arts engagement and interest mediate, at least partially, the relation of openness to experience to SWB components, namely life satisfaction, positive affect, and negative affect. Results of mediation analyses revealed a positive relation between openness to experience and positive affect, which was partially explained by arts engagement but not by arts interest. These results not only confirm the relevance of the arts to happiness, but also offer new insights into how openness to experience provides conditions that are conducive to positive affect.

Keywords: Openness to experience, arts interest, subjective well-being, positive affect, mediation analysis
Presentation type: Oral presentation / Talk
Session: Experimental Aesthetics I

Benefits of including attention in dynamic process models of multi-attribute dietary choice

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University of Hamburg

Sequential sampling models, such as Drift Diffusion Models (DDM), are used to understand choice processes. In recent years, these models have become increasingly elaborate, for example by considering the choice options' underlying attributes, or attentional dynamics during decision making. Here we compare different DDMs of varying complexity to elucidate the mechanisms underlying hunger-driven effects in dietary choice. The models were fit to data of 70 participants completing a binary food choice task in hungry and sated states (within-subject design) while their eye-movements were being recorded. The considered attributes of the binary options were taste and health as represented by food images and corresponding nutritional scores, respectively. Confirming our preregistered hypotheses, participants were more likely to choose tasty over healthy food items, and this difference was amplified by hunger state. Notably, attention emerged as a pivotal mediator in this relationship. To understand the mechanism driving behavioral effects, we compared regular DDMs with attentional DDMs, multi-attribute attentional DDMs (maaDDM), and a multi-attribute time-dependent DDM that allowed the weights for taste and health to enter the choice process at different times. All models included two weights for taste and health, and versions with and without starting point bias were fitted. We found no evidence for time-dependent onsets of the two attributes. Instead, DDMs taking attention into account, specifically the maaDDM with starting point bias, best predicted our behavioral results. Together, our findings highlight the importance of taking attention into account when modeling dynamic processes of decision-making.

Keywords: Computational modeling, Drift Diffusion Models, Attention, Food Choice
Presentation type: Oral presentation / Talk
Session: Computational modeling in experimental psychology: Linking model-based and processtracing analyses

Me or We? Action-Outcome Learning in Synchronous Joint Action

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Goal-directed behaviour hinges on mental representations that encode instrumental relationships between actions and their outcomes. The present study investigated how people acquire such representations during joint actions whose outcomes depend on synchronized contributions of multiple co-actors. Adapting a well-established two-stage action-outcome learning task to a synchronous joint action context, we tested if co-acting individuals would link jointly produced tone outcomes to features of their individual action contributions only or to group-level features of their joint action contributions instead. While our results reveal limitations of associative action-outcome learning in joint action contexts, they show that action-outcome representations acquired in joint action contexts encode group-level relations between co-actors' joint action contributions and affect subsequent construal of ambiguous task instructions. Our findings inform current debates on the limits and mechanistic nature of action-outcome learning and provide novel evidence that planning and control of joint action is supported by dedicated representational structures encoding group-level relations between own and others' action contributions.

Keywords: Joint Action, Action-Outcome Learning, Joint Goals, Ideomotor
Presentation type: Poster Presentation
Session: Motor and Action Control

How Action Goals Shape Imitative Response Tendencies

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Understanding people's tendency to imitate others' actions is central to research on social interaction. Yet, an unresolved question is how imitative response tendencies become shaped by higher-level goals guiding observed and executed actions. We approached this question by investigating whether effects of congruency between observed and executed actions become modulated when both actions contribute to an overarching joint action goal. In three online experiments, participants selected one of two action targets that differed on a relative magnitude dimension in turns with a virtual partner. We manipulated imitative congruency between co-actors' actions at the level of their individual goals (selecting the target with the higher/lower value) and on the level of their spatial response features (selecting the right/left target). The first two experiments revealed large performance costs when participants were explicitly instructed to adopt incongruent goals compared to their partner, which was further found to reverse imitative congruency effects related to spatial features of co-actors' executed responses. Crucially, reframing the task by instructing participants to produce joint outcomes together with their partner did not influence the result pattern. The third experiment showed that others' action goals have persistent effects on subsequent action performance even when they are not explicitly task-relevant and when congruency relations between one's own and others' action goals are cued in advance. Our results support goal-directed theories of imitation and show that contagious effects of others' action goals persist in joint action contexts.
Keywords: Imitation, Joint Action, Social Interaction, Action Goals
Presentation type: Oral presentation / Talk
Session: Joint Action

Opening up or Closing off? – an Agent-Based Model of Self-Disclosure

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Self-disclosure refers to the process of revealing information about oneself to another and has been shown to have influence on individual well-being and interpersonal relationships. Most research on self-disclosure behavior focuses on intrapersonal processes and dyadic interactions without actively examining large-scale patterns that emerge from these small-scale events. Our study aims to fill this gap by examining the social dynamics of self-disclosure using agent-based modeling (ABM). ABM is a computational modeling approach in which rules for simulated agents' actions and interactions are defined and then examined for their connection to the overall social system. Based on relevant theoretical assumptions and empirical findings on self-disclosure from the literature, we developed an ABM, which we then analyzed using social network analysis.

Our research reveals how systematic, dynamic, large-scale patterns and self-stabilizing social networks can emerge from simple decision-making and self-disclosure strategies. On this basis, we provide insights into how, within these networks, different agents can either end up in upward spirals towards intimate, self-disclosure-friendly relationships or in downward spirals towards isolation and concealment. We conclude that interventions seeking to improve individual well-being and interpersonal relationships through self-disclosure benefit from considering and targeting larger elements of the surrounding social network.

We discuss the methodological opportunities and potential pitfalls associated with utilizing ABMs as a theoretical tool. We explore their capability to understand the interaction of individual behavior and social dynamics, and how psychological processes associated with self-disclosure can better understood through their embeddedness in a larger social network.
Keywords: self-disclosure, agent-based modeling, social network analysis, social context, computational modeling
Presentation type: Oral presentation / Talk
Session: Social Psychology

The Impact of Computerized Cognitive Training on TVA Parameter Visual Processing Speed and Other Cognitive Measures in Post-COVID Patients

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Cognitive dysfunction is a frequent and severely debilitating symptom in post-COVID syndrome (PCS). Previously, we found that visual processing speed is reduced in PCS patients and relates to their level of mental fatigue. Without targeted intervention, cognitive dysfunctions may become chronic. This intention-to-treat study evaluates the efficacy of a self-administered app-based cognitive training for PCS patients with post-infectious mild cognitive impairment.

A randomized controlled trial assigning PCS patients 2:1 to the intervention group ("NeuroNation-MED" training three times weekly for 12 weeks alongside standard care) or a wait-list control group (standard care) was conducted. The primary outcome was the global score in the Neuropsychological Assessment Battery (NAB). Visual processing speed was assessed through a whole-report-task using briefly presented letter arrays and computational modeling based on Bundesen's theory of visual attention. Additionally, processing speed was measured in a simple-response-task of the Test of Attentional Performance (TAP). Other NAB subdomains, additional TAP tasks, and patient-related outcomes, including subjective cognitive failures, fatigue, and neuropsychiatric symptoms, were also examined.

Results indicate significant effects of the training for the main outcome, the processing speed indicators and for several other cognitive outcomes. Among patient-related outcomes, a significant effect was found for cognitive failures in daily life.

App-based neurocognitive training enhances neurocognitive functions in PCS patients with post-infectious mild cognitive impairment. Particularly the slowing of processing speed can be addressed. A specific training gain was found for the cognitive domain, as among the patient-related outcomes only cognitive failure ratings, but not fatigue, psychological burden or sleep were improved.

Keywords: Theory of visual attention, processing speed, neurocognitive training
Presentation type: Oral presentation / Talk
Session: Progress in TVA-based Visual Attention Research: From Fundamentals to Applications II

Mechanisms, entities, and theory: A discussion of general rules to evaluate theories

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Challenges in the relationship between theory and observation, such as the theory-ladenness of observations, can be interpreted as a call for general methods to evaluate theories independently of observational data. In this presentation, I will discuss such methods, with a focus on theories about mechanisms of higher cognitive functions. Central to the discussion is the definition of a 'mechanism' as a set of entities with specific properties that lead to systematic activity. I will explore the following key points as problematic: Theories based on proposing novel, dedicated mechanisms (i.e., introducing new entities), theories based on concepts that are challenging to link to any tangible entity, and theories that are only specified at a singular level of abstraction (i.e., overlooking entities at lower levels). All three aspects relate to the principle of parsimony, which favors theories requiring fewer assumptions. However, this discussion aims to refine the definition of 'assumption,' to reduce ambiguity in applying the parsimony concept, thereby enhancing its utility in evaluating theories in cognitive sciences independently of observational data.

Keywords: theory, mechanism, parsimony, higher-cognitive functions, cognitive science
Presentation type: Oral presentation / Talk
Session: Towards a Sustainable Experimental Psychology: Theory, Replicability, Behavior

Assessing parental couples' dyadic coping using a modified lab-based interaction paradigm - A multi-site pilot-study

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In couple research, dyadic coping (DC) describes verbal and nonverbal behaviors couples use to jointly cope with stress. Ample evidence shows that DC is a robust predictor of relationship satisfaction (e.g., Falconier et al., 2015). While DC has often been assessed using self-report measures, more recent studies have used observational data, i.e., the systematic coding of video-recorded couple interactions according to standardized procedures in the lab. Following a structured interaction paradigm, each individual is asked to tell their partner about a stressor external to the relationship (e.g., job-related stressors). However, a large portion of parental stress appears to originate from events or circumstances which are child-related such as children's behavior or mental health problems. To specifically assess how parents cope with such child-related stress, we modified the original DC interaction paradigm (Bodenmann, 2008). To evaluate the feasibility of this modified paradigm for future research, we are currently conducting a multi-site proof-of-concept study at three different locations (Munich, Vienna, Witten/Herdecke). In a target sample of N = 60 couples with children between the ages of 4 to 16, we aim to test the modified paradigm against the original DC paradigm years to compare both paradigms in terms of their associations with relevant outcome variables on a trait- and state-level (e.g., perceived stress, experienced emotions, relationship satisfaction). In this poster presentation, the feasibility, limitations, and potential benefits of our novel paradigm for future research are discussed.

Keywords: parental stress, dyadic coping, couple interaction, video-based observational coding
Presentation type: No-Data Poster
Session: Interaction and Social Psychology

Cognitive load and picture ambiguity: How do they affect our aesthetic impression?

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Several cognitive factors, including processing speed, memory processes, and meaningful interpretation of stimuli, influence their aesthetic impression. In this study, we investigated whether cognitive load in one task modulates the aesthetic impression of pictures in another task. To manipulate cognitive load, participants remembered a sequence of two numbers (low load) or four numbers (high load) and then rated the aesthetic appearance of pictures on a seven-point scale in terms of their evoked liking, interest, and stimulation. The pictures depicted an everyday scene (non-ambiguous pictures) or were alienated by the inclusion of a semantically incongruous object in the scene (ambiguous pictures). Following the aesthetic rating of the pictures, participants completed a probe number sequence by filling in the missing number. Faster response times and higher percentages correct responses in the low load condition compared to the high load condition ensured the successful manipulation of cognitive load. Processing load increased rated liking and stimulation, but interest was not affected by cognitive load. This load effect was present for both ambiguous and non-ambiguous pictures. Furthermore, participants liked the ambiguous pictures more, found them more stimulating and also rated them as being more interesting than the non-ambiguous pictures. In conclusion, the results suggest that both cognitive load and image ambiguity differentially influence the aesthetic impression of a picture.

Keywords: aesthetics, cognitive load, ambiguity, rating, picture processing, art
Presentation type: Poster Presentation
Session: Perception II

Modeling Sequential Collaboration: Exploring Cognitive Mechanisms of Collaborative Judgments

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Contributors in online collaborative projects, such as Wikipedia, often engage in sequential collaboration to work together. After the initial creation of an entry, contributors form a sequential chain by adjusting and maintaining incremental versions of an entry. Recent research has tested sequential collaboration for the aggregation of numerical judgments showing that judgments become increasingly accurate along the sequential chain. Final estimates even had similar accuracy as aggregated, independent judgments (wisdom of crowds). Sequential collaboration profits from an implicit weighting of judgments by expertise since contributors adjust judgments they can improve but maintain judgments they cannot improve. Since a theory of sequential collaboration is currently lacking, we introduce a computational cognitive model for both sequential collaboration and independent individual judgments. The model considers individuals' expertise as a predictor for judgment accuracy. Moreover, we consider the presented entry of a previous contributor as both a potential sources of anchoring bias and a potential frame of reference reducing the dispersion of individuals' plausible judgments. Simulations show that the proposed computational model can describe patterns observed in previous empirical studies. Additionally, a new empirical investigation involving long sequential chains supports for a novel prediction of the model. Overall, the computational model does not only enhance our understanding of the mechanisms underlying sequential collaboration, but also provides an initial theoretical framework for research regarding sequential collaboration.

Keywords: advice taking, anchoring, cognitive modeling, group judgment
Presentation type: Oral presentation / Talk
Session: Decision Making I

Validation of the Insight/Non-Insight Problem Solving Self-Report Procedure via Clustering Algorithms

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Sometimes, problems are solved with a sudden leap of understanding, which is often met with an Aha! Experience. Initially, we tend to employ analytical strategies to solve problems (non-insight). Studying insight has proven difficult because of its elusive nature. An often-used procedure to identify whether insight occurred is relying on participants' insight/non-insight self-reports after each solved problem. However, it remains unclear whether insight and non-insight are consistently identified similarly across participants, and on which features this classification is based (e.g., solution confidence). We argue that if the solution types derived from self-reports are consistent, we should also be able to detect them as naturally occurring clusters in the data, independently from self-reports. To address this, we asked participants (N = 65) to complete word puzzles solvable with insight and non-insight. Participants tracked their closeness-to-solution while problem-solving. After each solved problem, they completed the insight/non-insight self-report, and then indicated their confidence in the solution, and the insight intensity. We applied several clustering algorithms based on the online closeness-to-solution data, solution confidence, insight intensity, solution accuracy, and solution time. Based on these features and clustering algorithms, we observed two clusters closely aligning with self-reported insight and non-insight solutions. Moreover, the cluster identification consisted of a combination of the features, not just one that biases the insight classification (e.g., a preponderant influence of solution time). These results contribute to assess the validity of the insight/non-insight self-report procedure, showing how participants consider their problem-solving experience in a similar and shared way.

Keywords: Insight Problem Solving, Aha! Experience, self-report procedure, clustering
Presentation type: Oral presentation / Talk
Session: Metacognition and Problem Solving

The role of confidence in regulating pre-decisional information search in sample-based decisions

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Decisions are almost always preceded by information search aimed at finding the option that is most preferable. How much information one acquires before making a decision should depend on how sure one wants to be. This aspired confidence level presumably plays an important role in regulating pre-decisional search.
To investigate this role, we conducted two experiments (Ntotal=238) aimed at manipulating participants' general confidence, in which they made binary decisions based on self-truncated information and reported their confidence.
In the first experiment, one condition received negatively distorted decision feedback while the other received accurate feedback before completing the remainder of the decisions without any additional feedback. As expected, participants in the distorted-feedback condition collected significantly more information. Mixed-model-analyses indicate that they needed more evidence to reach the same confidence level as the control condition.
The second experiment manipulated the ratio of information cost and payoff across two blocks of 60 decisions each, such that information was relatively more expensive in the second block. Again, mixed-model analyses indicated that in the second block participants needed more evidence to reach similar confidence levels. The adaptivity of this behaviour and its potential will be the focus of the discussion.

Keywords: confidence, information search, decision making, sampling, metacognition
Presentation type: Oral presentation / Talk
Session: Decision Making II

Can people keep track of a location in the real world while moving around in virtual reality?

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Justus Liebig University Giessen

After removing a virtual reality (VR) headset we can be surprised to find we are facing an unexpected direction. In 3 previous experiments we investigated if people could keep track of objects in the real world while in VR. Participants' task was to point to previously seen targets in the real-world lab while in a virtual replication of the lab. The VR lab could be aligned or misaligned to the real-world lab (pitched up or down). Pointing end points were based primarily on the locations of objects in VR suggesting that people might not update the egocentric reference frame when the environment changes.
In the current study, we investigated if people could keep track of the real-world door while moving in VR. Participants completed 3 conditions: (a) baseline condition where the real and VR labs were aligned, (b) infinite floor condition, and (c) rotation condition with the VR lab yawed by 45°. Participants' task was to approach and hit randomly positioned spheres in VR and then point to the real-world door.
Performance was accurate in the baseline (1.08° error) and increased when only an infinite floor was visible (12.54° error). In the rotation condition pointing errors were highly affected by the location of the virtual door causing the largest error (37.28°).
While immersed in VR, participants appear to rely primarily on allocentric information to inform them about the real world. This suggests that people might struggle to accurately update egocentric information in the face of conflicting allocentric information.
Keywords: Virtual Reality, Reference Frames, Pointing, Updating
Presentation type: Oral presentation / Talk
Session: Egocentric and allocentric reference frames: Integrating across measures, task complexity, and spatial scales

Reference frames and sensory weighting in naturalistic perception-action loops

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I will present results of new paradigms that address the neural computations for human spatial orientation and closed-loop navigation. These computations may rely on sensory signals (visual, vestibular), motor feedback and internal predictions, as well as cognitive signals, which all have differences in noise properties, internal dynamics and intrinsic reference frames. How these signals are integrated in the underlying perception-action loops has remained difficult to quantify since the quality of these signals can typically not be measured in isolation. I will present our recent work combining behavioral modeling and experimental psychophysics to characterize signal (re)weighting in ego- and allocentric reference frames in the perception-action loops for spatial orientation and navigation in health and disease.
Keywords: reference frames, multisensory, sensorimotor, Bayesian, clinical
Presentation type: Oral presentation / Talk
Session: Egocentric and allocentric reference frames: Integrating across measures, task complexity, and spatial scales

Locomotion through virtual environments: Surprising objects induce age effects on gaze guidance and object memory

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Gaze behaviour during locomotion must balance sampling relevant information and the need for a safe and stable gait. Aging might affect this balance due to an increased risk of falling as well as decreased uptake of sensory information. Here we investigated how violations of expectations influence gaze behaviour in younger and older adults.

In this study, participants (YA: $N = 22$, $M = 24.3$ years; OA: $N = 12$, $M = 67.7$ years) moved through a virtual reality (VR) reconstruction of a real-world university hallway wearing a VR headset. Participants were instructed to locomote without additional task. We placed semantically congruent (e.g., an office printer) and incongruent target objects (e.g., a bass) in the hallway to investigate how gaze behaviour during locomotion is influenced by expected or unexpected objects. After data collection, the participants were asked to freely recall as many of the objects as possible.

Gaze behaviour was subject to a significant interaction effect between the factors age group and object congruency. Older adults showed lower dwell times on congruent objects than younger adults. Dwell times on incongruent objects were boosted in both age groups, but to a larger extent in older adults. Free recall for incongruent objects was significantly better than for congruent objects in both age groups. However, this benefit was more pronounced in older adults.

Our findings show that surprising information attracts attention - particularly in older adults. In real-world scenarios such a benefit in information processing might come at the cost of reduced gait safety.

Keywords: aging, gaze behaviour, locomotion, schema violations, object memory
Presentation type: Oral presentation / Talk
Session: Motor Development and Cognition

Is Task Switching Avoided to Save Effort or Time? Shorter Intertrial Durations Following Task Switches Increase the Willingness to Switch Tasks

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Human decision-making is often described in terms of cost-benefit analyses. In voluntary task switching, the typical avoidance of task switches (repetition bias) has been primarily explained by effort costs. The present study investigated whether temporal costs independent of effort also guide the decision to switch. In two preregistered experiments (N1=86; N2=85), we used a hybrid task-switching paradigm with a mixture of predetermined (forced-choice) and voluntary (free-choice) trials. The duration of the intertrial interval after a switch was manipulated between blocks to be either always longer or shorter than after a repetition. The results showed increased voluntary switch rates in blocks with a shorter interval following switches whereas the performance was not affected. Moreover, the effect was still evident in Experiment 2, where the interval was manipulated only after forced-choice task switches. This suggests that the temporal costs associated with switching contribute to the switch avoidance.
Keywords: cognitive flexibility, voluntary task switching, temporal costs
Presentation type: Oral presentation / Talk
Session: Multitasking and Cognitive Control I

Subjective sleep characteristics and their association with attentional parameters in adult ADHD

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Besides attentional deficits, adults with Attention Deficit/Hyperactivity Disorder (ADHD) report more sleep problems than healthy adults (Díaz-Román et al., 2018). Poor sleep quality profoundly affects cognitive function, prompting questions about its association with attentional deficits in adults with ADHD.
Our study aimed to 1) assess differences in subjectively reported sleep parameters between adults with and without ADHD, and 2) relate subjective measures of sleep with objective attention measures. We examined a group of adults with ADHD unmedicated at the time of testing (n=39, age: M=32.2 years, SD=11.1, 22 female) and an age- and gender-matched control group. Subjective sleep parameters were assessed via questionnaires, primarily the Pittsburgh Sleep Quality Index (PSQI). Cognitive measures were obtained through the whole-report paradigm based on the Theory of Visual Attention.
Based on preliminary analyses, adults with ADHD reported significantly poorer sleep quality and efficiency, shorter sleep time and longer sleep latency than healthy controls. In the ADHD group, subjective sleep quality and efficiency were significantly associated with visual working memory capacity K.
In conclusion, adults with ADHD showed significant differences in subjective sleep parameters, indicating an overall worse subjective sleep quality. Associations between sleep parameters and K, previously identified as reduced in adults with ADHD (Finke et al., 2011), were evident in this ADHD cohort, although no significant reduction of K was found. Nevertheless, our findings emphasize the connection between sleep and cognition in adults with ADHD. Objective sleep parameter analyses for this cohort are still pending.
Keywords: adult ADHD, sleep quality, Theory of Visual Attention
Presentation type: Oral presentation / Talk
Session: Progress in TVA-based Visual Attention Research: From Fundamentals to Applications II

It's all relative? The influence of stimulus configurations on motion perception

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When asked to localize the onset or offset location of a dynamic moving object, systematic biases in, as well as against the direction of motion have been systematically observed (Fröhlich effect, Onset-repulsion effect, Representational Momentum effect, Offset-repulsion effect). Recent evidences (Merz et al., 2022) suggests a systematic change of these biases with changes in stimulus speeds, as well as a close, mirroring relationship between the course of change for perceived onset and offset. With the goal of replicating this basic finding, several experiments with different stimulus configurations were designed to investigate whether this pattern of results can be generalized to different stimulus configuration (different stimulus size; radius of circular motion trajectory; target presentation), and to analyze the importance of absolute and relative stimulus speed for this data pattern. Overall, the results indicate a robust data pattern across different stimulus configuration, and the results are discussed on the background of the recently introduced Speed Prior account of motion perception.
Keywords: motion perception; stimulus configuration; representational momentum; Fröhlich effect; Onset & Offset repulsion, localization
Presentation type: Poster Presentation
Session: Perception III

Measuring Time-Dependent Drift Rates in Diffusion Processes Through Metacognition

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Drift diffusion models with time-dependent drift rates have gained popularity because they allow the speed at which internal evidence accumulates to vary over time. Here, we aim to provide more direct evidence for the time course of evidence accumulation using participants' metacognitive judgments: We model the evidence accumulation processes as a confidence-weighted majority vote — which is typically only used to study group decisions. In the same way as a group member adds a vote and a confidence rating to a group decision process, we model each time step of a visual evidence accumulation process to add a vote and confidence rating (corresponding to the noisy visual evidence accumulated at that time point). This allows us to disentangle the contribution of each time step to the overall task performance. In a simple psychophysical experiment, N=6 participants each measured in three 2 h long sessions discriminated masked horizontal/vertical stimuli at different presentation durations. Using log-odds transformation and calibration, we obtained estimates for the internal evidence distribution after different presentation durations. Despite substantial interindividual differences, participants showed a reliable acceleration in their evidence accumulation throughout the first 50 milliseconds of stimulus presentation. In conclusion, our approach replaces model assumptions by metacognitive measures to estimate time-dependent drift rates, which may give more empirical access to time-dependent drift rates but can also be biased by participants' metacognitive abilities.
Keywords: metacognition, masked discrimination, drift diffusion models
Presentation type: Poster Presentation
Session: Metacognition

Abruptness of tone onsets, but not offsets elicits the auditory-induced bouncing/streaming illusion

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The way we perceive the movement of two intersecting discs can be influenced by auditory information. When a brief tone is played at the moment when the discs overlap, people tend to report that the discs bounce off each other instead of streaming past each other. This is known as the auditory-induced bouncing/streaming illusion. In four experiments, we studied how the abruptness of tone onsets and offsets affects the bouncing/streaming illusion. We found that tones with more abrupt onsets and offsets resulted in a higher proportion of bouncing impressions than tones with smoother onsets and offsets (Experiment 1). This effect was not due to differences in volume between the tones (Experiment 2). Additionally, we found that it was the abruptness of the tone onset, rather than the offset, that caused the increase in bouncing impressions (Experiment 3). This effect was observed regardless of the temporal alignment of the tones with the moment of visual overlap (onset-aligned vs. centered vs. offset-aligned; Experiment 4). We discuss these findings in terms of perceptual and decisional explanations of the bouncing/streaming illusion.

Keywords: Audio-visual integration, bouncing/streaming
Presentation type: Oral presentation / Talk
Session: Crossmodal Perception / Synesthesia

CANCELLED - Measuring Visual-Search Slopes: A Validation of the Systematic Search Task

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The slope of the function relating response times to the number of stimuli in a visual-search display is extensively utilized to assess theories on a broad range of cognitive functions. Unfortunately, this indicator of search speed is subject to various confounding factors. To overcome this issue, we have recently introduced and the present study validates the systematic search task as a novel technique to measure search speed. In contrast to the traditional manipulation of set size, the systematic search task operates with a constant number of stimuli arranged in a clock-like manner. In this setup, the position of the search target is manipulated. When inducing a reliable clockwise search order, the slope of the function relating response times to the target positions (position slope) is our new measure of search speed. This slope captures all search-related processes, such as the visual processing of each stimulus and perceptual decision making as to whether it is a target or not. By contrast, the intercept reflects activities that are independent of search proper, such as the selection and execution of the motor response. We validate this model through two experiments, manipulating the complexity of stimuli and response formats, respectively. The results confirm our expectations, showing steeper position slopes for more complex stimuli and a higher intercept for more complex responses compared to simple ones. We assert that the systematic search task serves as a valid method for capturing search speed and may prove valuable for future research on visual search and beyond.

Keywords: visual search, search slopes, position slopes, serial vs. parallel, clump scanning, processing speed
Presentation type: Poster Presentation
Session: Methods

Temporal distortion in virtual reality: investigating the convergence of arousal and valence on time perception

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The subjective experience of time, although fundamental for our everyday functioning, doesn't always match the ticking of the clock. Indeed, it is well reported in the literature that time is a sort of illusion whose perception is modulated by our emotions. The detailed link between emotional experiences and time perception remains unclear. It has been argued that different valenced emotional events affect our level of arousal and impact our time-tracking ability. However, there is no agreement on the level at which this disruption occurs. Is the emotional event impacting how much we subjectively feel activated, or does it trigger a specific physiological response for different valences? And which of those contributes to temporal distortion? The present study was designed to disentangle the contribution of arousal (psychological and physiological) and valence in temporal distortions, using Positive, Negative, and Neutral stimuli. We asked University students to complete a series of temporal tasks including Finger Tapping, Retrospective Judgement, and Time Production while watching emotionally salient video in an Immersive Virtual Reality Environment. Before and after the presentation of each video participants' subjective perception of both activation (arousal) and pleasantness (valence) was assessed with Self-Assessment Manikin. Furthermore, cardiac and electrodermal activity were recorded as a measure of physiological activation. The results showed that the negative video was either perceived as more activating either elicited a stronger physiological response. Further, while watching a negative video participants over-produced time. The results confirm, from a psychophysiological perspective, the effect of arousal on time perception.

Keywords: Immersive Virtual Reality, Emotion, Time Perception, Physiological Indexes, Heart Rate, Skin Conductance, Arousal

Presentation type: Oral presentation / Talk

Session: Virtual Reality and the Perception of Time

The Power of Mind: The Use of Force Sensors to Measure Cognitive Processes

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BACKGROUND
Measuring the timing of mental processes is crucial in experimental psychology. However, reaction time methods do not provide dynamic data. Other methods like EEG might be time- and effort-consuming. Recent studies from our and other labs showed that mental processes – such as language comprehension, attention, or numerical processing – dynamically affect the grip force when people hold a simple-to-use force sensor (e.g., Miklashevsky et al., 2022; Miklashevsky, 2022). The current study aimed to deepen the understanding of force signals to study cognition by (1) disentangling stimulus- and response-related processes and (2) examining the effects of lateral attention shifts on holding force.
METHOD
In five experiments, we measured participants' (N = 39) bilateral passive holding force while guiding their attention with external cues (lateral stars) and symbolic cues (central arrows or the words 'left' or 'right'), either with or without explicit responses.
RESULTS
Both early attention shifts caused by stimuli and later response preparation processes consistently influenced holding force. These force signatures emerged well before overt motor responses were given.
DISCUSSION
Continuous holding force registration is a convenient new way to study cognitive dynamics. Our results demonstrate that tracking holding force with high temporal precision distinguishes stimulus- vs. response-related, as well as attentional processes. We propose a data-processing pipeline that can be flexibly adjusted for research of other cognitive phenomena using the force registration method.

References:
Miklashevsky, A., Fischer, M. H., & Lindemann, O. (2022). Acta Psychologica, 231, 103791. doi:10.1016/j.actpsy.2022.103791
Miklashevsky, A. (2022). PLoS ONE 17(7): e0262510. doi:10.1371/journal.pone.0262510

Keywords: grip force, holding force, force registration, cognitive processes, attention, time-resolved data
Presentation type: Oral presentation / Talk
Session: Embodied Cognition

Analyzing Driver Decision-Making in Narrow Passages: An Experimental Study on the Effects of Arrival Time, Speed and Automation Level of Oncoming Vehicles

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Vehicle conflicts in mixed traffic present critical safety challenges, especially with the emergence of automated vehicles. Such conflicts often occur when two vehicles attempt to occupy the same space simultaneously, as seen in narrow passages that allow only one vehicle to pass at a time. While the first arriving vehicle typically claims the right of way in human traffic, it is uncertain if this norm extends to interactions with automated vehicles, given that road users expect different behaviors and driving styles from them. This study employs an experimental paradigm to examine human drivers' decision-making processes when encountering both automated and manually-driven vehicles with varying arrival times (4s, 6s, and 8s) and speeds (25 km/h and 50 km/h). Conducted in a controlled laboratory setting, participants were asked to make 240 "drive" or "wait" decisions (20 repetitions per condition) by pressing a corresponding key while observing a video of a vehicle approaching a narrow passage. The study analyzes the effects of these factors on reaction times and provides directions for computational modeling approaches of drivers' decision-making processes when interacting with automated vehicles, for instance, with drift-diffusion modelling.

Keywords: automated vehicles, narrow passage, time to arrival, decision-making, mixed traffic, laboratory study
Presentation type: Oral presentation / Talk
Session: Experimental Engineering Psychology and Human Factors II

Try not to laugh. Laughter Suppression and Contagious Laughter during Humoristic Experiences.

Vanessa Mitschke, Anne Schacht
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Laughter plays a vital role in nurturing social connections and easing negative emotions. However, the dynamics of laughter take an intriguing turn when one attempts to suppress it. The act of suppressing laughter is a valuable social skill, especially in contexts where displaying joy is discouraged. To investigate the consequences and mechanisms of laughter suppression, we conducted two experiments. In Experiment 1, participants were exposed to humorous auditory stimuli (jokes) and instructed to suppress their laughter using two emotional regulation techniques: expressive suppression (ES) and cognitive reappraisal (CR). Our findings from Experiment 1 unveiled a significant reduction in perceived hilarity during CR. This decrease in positive appraisal was also mirrored in facial expressions, where CR decreased the reactions compared to unconstrained listening, while ES entirely suppressed smiling, particularly for mildly to moderately amusing jokes. Interestingly, very humorous jokes proved challenging to suppress across all conditions. In Experiment 2, we investigated the impact of laughter mimicry and social appraisal on humor suppression by incorporating pre-recorded laughter videos alongside the jokes. Suppression of laughter mimicry proved exceptionally challenging, especially after exposure to jokes. The presence of others' laughter concurrently heightened the perceived humor of the joke. Notably, while ES didn't diminish amusement in Experiment 1, the act of suppressing laughter while others were laughing did lead to a significant reduction in amusement during Experiment 2.

Keywords: emotion regulation, facial reaction, suppression, emotion
Presentation type: Oral presentation / Talk
Session: Facial Expressions I

Is there an advantage to free task choices? Effects of unpredictable processing difficulties on free- and forced-choice behavior

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The present study investigates the influence of unpredictable perceptual and central decision processing difficulties on task choice and performance when tasks are either freely chosen or assigned. In Experiments 1 and 2, perceptual processing difficulty varied by altering colored dot proportions (easy vs. hard color discrimination task). In Experiment 3, decision processing difficulty was adjusted by changing the rotation degree of letters (easy vs. hard letter rotation task). Participants adjusted their task choices towards tasks with easier stimuli when perceptual difficulty varied, but decision difficulty showed minimal, if any, impact on choices. Considering also the free-choice performance results of the task with equal difficulty, the combined findings suggest a model in which, after some parallel perceptual processing, a task is selected before more serial central processing continues. Moreover, across all experiments, both free-choice and forced-choice performance were more impaired when responding to a harder stimulus than to an easier
one, but this effect was generally less pronounced in freely chosen tasks. This suggests that free task choices enable a more stable processing mode, making people less affected by variations in information difficulty and this notion is further supported by exploratory diffusion modeling results. Overall, we propose that some advantages of free-task over forced-task behavior are that people can avoid more difficult tasks by adjusting their choices in response to varying perceptual processing difficulties, and that processing in free-choice tasks is generally less affected by environmental changes, presumably due to a more robust internal representation of a freely chosen task goal.

Keywords:
Presentation type: Poster Presentation
Session: Cognitive Control and Conflict II

Mechanistic influence of lay beliefs of willpower: How lay beliefs of willpower influence effort mobilization to a cognitive-control challenge following ego-depletion

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University of Vienna

Consistent evidence has illustrated that people's underlying lay beliefs about the limited or nonlimited nature of their willpower can moderate the classic ego-depletion effect. However, the exact mechanisms through which these lay beliefs counteract the influence of ego-depletion remain unidentified. In this talk, I will present current research aimed at identifying the precise mechanism at play. In an experimental design, participants were manipulated to either hold a limited or nonlimited lay belief of willpower. After the belief manipulation, participants completed a standard dual-task paradigm procedure. This procedure first induced ego-depletion and then examined the ability of lay beliefs of willpower to alter effort-related cardiovascular responses to a subsequent cognitive-control challenge.
Keywords: Ego-Depletion, Effort-Related Cardiovascular Response, Lay Theories of Willpower
Presentation type: Oral presentation / Talk
Session: The intensity of mental effort: Hot news from the body

Co-Representing Other People's Action Plans: A Binding Perspective on Mentalizing

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As exceptionally social beings, it is typically not sufficient for humans to represent only their own action plans. Through the lens of feature-based action control theories, we investigated how humans represent other people's plans in addition to their own. Prior to executing intentional actions, actors create and maintain mental representations of their own plans. We draw on previous research demonstrating that planning an action involves the temporary binding of features that describe the action. For instance, when planning a keypress of a particular location (left vs. right) and duration (short vs. long), the respective action features (e.g., left and short) are bound. If other people's action plans were represented similarly as own action plans, the same feature binding should happen when we know that another person is planning an action, as when we plan it ourselves. In a tablet-based laboratory experiment, two participants sat opposite each other, and carried out short or long presses (duration) of two different colored buttons (location). To make the other person's actions relevant to the self, both participants had to perform well to gain a common reward. We tested the size of binding effects for location and duration features depending on the person planning the action (the self, the other person or no one). This allowed us to shed light on the integration of action features into representations of own and others' action plans and hence understand how we store our own assumptions about relevant others' future actions.
Keywords: action co-representation, joint action, event-file, action plan, action control, mentalizing
Presentation type: Poster Presentation
Session: Motor and Action Control

Binding and retrieval within and across events?

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How do we make sense of the environment we live in? An influential field in cognitive psychology suggests that many important functions like memory of incidents, reasoning, and attention depend on the way we segment the ongoing stream of perception (Zacks & Swallow, 2007). An open question still is, how the structure generated from a perceptual stream translates into behavior. To address this question, we combined the findings in event segmentation literature with another influential body of literature that analyzes mechanisms behind the control of individual actions (Frings et al., 2020). In particular, we analyzed how two very basic mechanisms in action control (integration and retrieval) are affected by boundaries between events. Two scenarios with different characters were used to implement events and boundaries between events. In two experiments, we measured binding and retrieval between individually executed responses that could be part of the same or separate events. In Experiment 1 (n = 40) we found binding effects only for responses that were integrated within an event, but not for responses that had to be integrated across an event boundary. In Experiment 2 (n = 77) we found that the effect of retrieval of a past response on further actions was hampered by an event boundary. Together, the experiments indicate that the structure we pick up from our environment can translate into ongoing action via modulation of the two basic mechanisms binding and retrieval.

Keywords: Action control; event file; response-response binding; event segmentation
Presentation type: Oral presentation / Talk
Session: Feature binding in action control and beyond II: How binding contributes to stimulus-response learning, cognitive control, and event segmentation

Does Cognitive distraction influence cyclists' behaviour?

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Hands-free phone use is legal and the most common type of secondary task engagement among cyclists. However, cognitive distraction due to interacting with somebody verbally may also interfere with cycling, especially for understanding complex traffic situations and anticipating other people's behavior. Therefore, its effect on cyclists' behaviour should be examined. This study investigates the behavioural effects of handsfree secondary cognitive task engagement among cyclists with a particular focus on overtaking and behavioural response in potentially critical situations.
In a cycling simulator 58 participants cycled 12 road segments with the possibility to overtake a slow cyclist. The road segments varied in road design and occurrence of critical events. The secondary task included three conditions that varied in level of cognitive demand. After the ride participants were asked to self-assess their cycling performance, perceived safety, and perceived distraction.
Results show a behavioural effect of road design but not of secondary task engagement, even though self-reported distraction increases with increasing cognitive demand. Overall, results indicate that the detrimental effects of engagement in secondary cognitive tasks are limited when the cycling tasks are on the skill-based or rule-based level and therefore require only limited cognitive resources. Thus, further studies should focus on more complex traffic situations which also could have a higher crash risk. On the other hand, at least for the level of complexity examined here, there seems to be no need to change legislation to reduce cyclists' crash risk.

Keywords: bicycle simulator, safety, cognitive distraction, secondary tasks
Presentation type: Oral presentation / Talk
Session: Traffic Psychology I: Human behavior and traffic safety

Event file binding and retrieval in the absence of coding conflicts

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Responding to a stimulus presumably creates a transient episodic link between individual stimulus- and response-related features, a so-called event-file (e.g., Hommel, 1998). Any feature repetition retrieves the whole event file, leading to impaired performance whenever the retrieved information does not match current processing requirements, so-called partial repetition costs (PRCs). In the widely-used S1R1-S2R2 task (e.g., Hommel, 1998), participants first perform a cued response (R1) after the onset of a stimulus (S1), followed by a binary-choice response (R2) determined by a feature of a subsequent stimulus (S2). In its typical implementation, the binary choice task for the S2 could be applied to stimuli presented as S1. This potentially leads to a conflict at S1 presentation if the to-be-executed response (signaled by the cue) violates the instructed response rule (for the S2). Importantly, this is confounded with the occurrence of partial repetitions between S1-R1 and S2-R2. The present experiment (N = 31) resolved the confound by eliminating the possibility to employ the S2 task at the time of S1. To this end, different stimuli for S1 (rectangle or diamond) and S2 (triangle or circle) were employed in a typical S1R2-S2R2 task with shape as response-relevant dimension for S2. Location, Color, and Response relation were systematically varied between S1-R1 and S2-R2. S2 latency and accuracy revealed PRCs for location, but not for color, suggesting that (1) event files linking spatial stimulus and response features are created in an unconfounded task setting and (2) not all stimulus features enter an event file format.

Keywords: binding, event file, action control, conflict, objects
Presentation type: Oral presentation / Talk
Session: Episodic Binding

Individual Differences in Switching Costs as a Reliable Measure of Cognitive Flexibility in Self-Organized Task Switching

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University of Freiburg

The study of task switching abilities and limitations offers valuable insights into human flexibility to adjust individual behavior depending on internal goals, and/or changing external demands. Consequently, understanding individual differences in multitasking becomes increasingly important, prompting an exploration into whether switching costs —manifesting as slower and/or more erroneous responses when switching between tasks compared to task repetition—reliably measure cognitive multitasking abilities at the individual level. So far, research on switching costs as a psychometric construct has been limited. Hence, our investigation focused on assessing the interindividual variability and reliability (examining split-half and retest measures) of switching costs, encompassing both forced choice and self-organized task switching scenarios. Preliminary findings indicate moderate to strong correlations in individual switch costs across various conditions, suggesting robust retest reliability. These results align with Schuch et al.'s (2022) study, which also reported sustainable split-half and retest reliabilities for switch-related response times.

Schuch, S., Philipp, A., Maulitz, L., & Koch, I. (2021). On the reliability of behavioral measures of cognitive control: Retest reliability of task-inhibition effect, task-preparation effect, Stroop-like interference, and conflict adaptation effect. Psychological Research. Advance online publication. https://doi.org/10.1007/s00426-021-01627-x https://link.springer.com/content/pdf/10.1007/s00426-021-01627-x.pdf

Keywords: switching cost, reliability, individual differences
Presentation type: Poster Presentation
Session: Cognitive Control and Conflict I

Local and global control adjustments to stimulus-based task conflict in task switching

Luca Moretti, Iring Koch, Stefanie Schuch
RWTH Aachen

In so-called conflict tasks (e.g., the Stroop) cognitive conflict is induced by the use of stimuli that simultaneously elicit a task-relevant and a task-irrelevant response. Under such circumstances, cognitive control is recruited to reduce response conflict and allow goal-directed behavior. Importantly, the extent to which control is recruited depends on the environmental circumstances. For example, control is recruited more strongly if response conflict has just occurred, or if it is likely to occur. Although much research has been devoted to characterizing such local and global control-adaptation mechanisms in response-conflict paradigms, it is currently unknown whether similar mechanisms are found when dealing with other conflict types. In particular, in the present studies we focused on control adaptation to the occurrence of task conflict. In four task-switching experiments, we measured task conflict as the performance costs associated with bivalent congruent trials (i.e., the employed stimulus afforded two tasks, but both stimulus features elicited the same response) and univalent trials. We found that such valency costs were reduced both following a bivalent trial and when bivalent trials were frequent, suggesting that local and global adaptations to task conflict occur similarly to what observed with response conflict. Furthermore, local control adaptation did not generalize when switching task, suggesting that the observed mechanisms may be task specific. Surprisingly however, global adaptation mechanisms displayed the opposite pattern, being present more strongly (or exclusively) in switch trials. Taken together, our results suggest that control recruitment is modulated similarly by the occurrence of response conflict and task conflict.

Keywords: Conflict adaptation, Cognitive control, Task switching, Task conflict
Presentation type: Oral presentation / Talk
Session: Multitasking and Cognitive Control II

Inhibitory Control of Mental Perspective Taking: Interference and Asymmetrical Switch Costs in a Laterality Judgment Task

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Laterality judgments (i.e., discerning whether a stimulus object is located on the left or right side of a reference point) take longer and are more error-prone when made from a third-person perspective (3rdPP) than from one's own perspective (i.e., first-person perspective, 1stPP). Furthermore, 1stPP interferes with judgments made from 3rdPP, evidenced in larger performance impairment the more the to-be-adopted perspective deviates from 1stPP. It has been suggested that such interference is minimized by inhibiting the 1stPP when adopting a 3rdPP. We investigated this conjecture by having N = 40 participants switch between a task involving laterality judgments from 1stPP vs. from the perspective of a stimulus figure which could be presented in back-facing (i.e., aligned with 1stPP) or front-facing (i.e., misaligned with 1stPP by 180°) format. Laterality judgments from 1stPP were overall faster and less error-prone than from 3rdPP but involved a larger switch cost. The switch cost asymmetry occurred despite a long interval for task preparation of 1000 ms. This result is consistent with the notion of inhibition of 1stPP processing which is not resolved during task preparation. Moreover, judgment from 1stPP was substantially impaired in trials featuring a front-facing compared to a back-facing figure, a finding usually absent in single-task 1stPP laterality judgments demonstrating that frequent switching between judgments made from 1stPP and from 3rdPP makes 1stPP processing vulnerable to interference from the imagined perspective. An intervention designed to stimulate 3rdPP did not alter the results.

Keywords: Mental perspective taking, laterality judgment task, switch costs, inhibitory control
Presentation type: Poster Presentation
Session: Cognitive Control and Conflict II

Dysfunctional neural pain modulation through experienced control in fibromyalgia patients

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Patients with chronic pain disorders such as fibromyalgia (FM) experience a drastic lack of control over the experience of pain. This is arguably one of the main causes for the high distress and impaired quality of life reported by patients. The way perceived control affects subjective pain as well as the underlying neural mechanisms are yet to be investigated. By using functional magnetic resonance imaging (fMRI), we examined the neural correlates of self-controlled compared to computer-controlled heat pain in healthy controls (HC, n=21) and FM patients (n=23). Unlike HC, FM failed to activate brain areas usually involved in pain modulation as well as reappraisal processes (right ventrolateral (VLPFC), dorsolateral prefrontal cortex (DLPFC) and dorsal anterior cingulate cortex (dACC)). In HC, computer-controlled (compared to self-controlled) heat caused significant activations of the orbitofrontal cortex (OFC), whereas FM activated structures typically associated with neural emotion processing (amygdala, parahippocampal gyrus). Additionally, FM displayed significantly decreased gray matter (GM) volumes compared to HC in DLPFC and dACC as well as disrupted functional connectivity (FC) of the VLPFC, DLPFC and dACC with somatosensory and pain (inhibition)-related areas during self-controlled heat stimulation. The functional and structural changes described provide evidence for extensive impairments of pain-modulatory processes in FM. Our investigation represents a first demonstration of dysfunctional neural pain modulation through experienced control in FM according to the extensive functional and structural changes in relevant sensory, limbic and associative brain areas. These areas may be targeted in clinical pain therapeutic treatments involving TMS, neurofeedback or cognitive behavioral trainings.

Keywords: fibromyalgia, pain, fMRI, functional connectivity, voxel-based morphometry
Presentation type: Oral presentation / Talk
Session: Psychological factors in chronic pain: Recent experimental results

Dual-task practice eliminates modality-based crosstalk by separating task representations in sensory brain regions

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The debate on the neural basis of multitasking costs evolves around neural overlap between concurrent tasks. Recent evidence suggests training-related reductions in representational overlap in fronto-parietal brain regions predict multitasking improvements. Cognitive theories assume that overlap of task representations may be associated with between-task crosstalk. Recently, modality-based crosstalk between the stimulus modality in one task and sensory action consequences in the concurrent task was suggested to affect multitasking costs. Increased costs for certain modality mappings were shown consistently, even when both tasks use non-overlapping stimulus and response modalities.

Whether modality-based crosstalk emerges from representational overlap in general multitasking or modality-specific regions is unknown. This functional imaging study investigates neural overlap in multitasking performance, focusing on modality compatibility by employing multivariate pattern analysis and modality-specific practice interventions in three groups (total N = 54) consisting of healthy young adults (18-30 years old, mean age 22.5). We observed differences between modality-compatible and modality-incompatible single-task representations, specifically in the auditory cortex but not in fronto-parietal regions. Notably, improved auditory decoding accuracy related to modality-incompatible tasks was predictive of performance gains in the corresponding dual task along with complete elimination of the modality-specific dual-task costs. This predictive relationship was evident only in the group practicing modality-incompatible mappings, suggesting that specific training on tasks with modality overlap influenced both neural representations and subsequent multitasking performance.

This study contributes to integrating cognitive theory with neuroscience about the role of task representation for dual-task interference.

Keywords: multitasking; task representation; modality-mapping; multivariate pattern analysis; fMRI
Presentation type: Oral presentation / Talk
Session: Changes for learning: how do changes in task-specific representations shape adaptive cognitive control?

Open Science: Why, How, and Where Is It Going?

Stefanie Mueller
ZPID - Leibniz Institute for Psychology

Psychological science entered a crisis when a lack of reproducibility, outright fraud, and the discovery of the prevalence of questionable research practices converged. Since then, funders, scientists, and the public have proposed or even demanded open science as a remedy to increase the accessibility, transparency, and reproducibility/replicability of psychological research. While these practices are generally perceived as positive and laudable, they often require increased effort on the part of the researchers, at least if pursued in a meaningful way (cf. FAIR principles). At ZPID, our mission is to promote open science practices by providing free-of-charge tools that reduce the burden on researchers while ensuring quality standards. One part of my talk will cover some of these tools (e.g., P-TOS, PreReg, PsychArchives), their adoption, and also their weaknesses. Another part will look beyond ZPID to developments in the scientific publication system, such as Registered Reports and PCI Registered Reports. While I will occasionally present empirical data, this talk will mainly reflect my subjective perspective as a former researcher who has moved into a research infrastructure position at an Open Science Institute.

Keywords: Reproducibility, Replicability, FAIR
Presentation type: Oral presentation / Talk
Session: Towards a Sustainable Experimental Psychology: Theory, Replicability, Behavior

Stroop interference as a function of stimulus material, presentation design, control condition and cognitive demand: neuroimaging and behavioral meta-analyses

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One of the best-known paradigms to study interference between cognitive processes is the Stroop task1. Over time, many variants of the task have evolved2, differing with respect to stimulus material (e.g. color-word, picture-word or number variants), control conditions (congruent or neutral), presentation design (mixed or blocked), as well as combinations with additional cognitive demands. The neural and behavioral impact of this variety, however, has never been systematically assessed. We performed a series of meta-analyses to synthesize behavioral and neuroimaging findings of studies implementing Stroop-type tasks and to investigate commonalities and differences between different versions. In total, the coordinate-based meta-analyses included 133 neuroimaging experiments, which reported 164 effect sizes for inclusion in the behavioral analyses. Results revealed little impact of task variations on the mean effect size of reaction time (g=0.64 across all 164 effect sizes, CI = 0.56-0.73). Neurally, incongruence processing in the classic color-word Stroop variant consistently recruited regions of the multiple-demand network, with some modulation of spatial convergence by stimulus material, control condition, design, and cognitive demand. In line with the view of a “many-to-one mapping”3, our results suggest that the seemingly unitary behavioral costs of Stroop-type conflicts may arise from partly different neural processing mechanisms, depending on contextual factors. The impact of different features of the task should therefore be carefully considered when planning or interpreting Stroop-type experiments, especially in clinical or other applied fields.

[1] Stroop, JR (1935). J.Exp.Psychol., 18:643-662.
[2] McLeod, CM (1991). Psychol. Bull., 109 (2):163-203.
[3] Westlin, C, et al. (2023). TiCS, 27(3):246-257.

Keywords: cognitive control, conflict resolution, meta-analysis, incongruence, activation likelihood estimation
Presentation type: Poster Presentation
Session: Cognitive Control and Conflict I

Abstraction in action coding and susceptibility to irrelevant spatial information: Are social action effects less influential when people pursue meaningful goals?

Romy Müller
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People can code their actions on different levels of abstraction, with reference to meaningful goals or arbitrary SR-mappings. Does this coding determine how they are influenced by others' actions? This question was addressed in a Simon task where participants reacted to the colour of circles with left or right keypresses, after which a partner moved another circle in the same or opposite direction. We varied the contextual embedding between three groups. The Goal group was instructed to sort dishes via keypresses, moving dirty (brown) plates to a sink and clean (white) plates to a cupboard. The SR-static group was simply told to perform keypresses depending on circle colour, but triggered no distal effects. The SR-dynamic group received the same instruction but triggered movements like the Goal group. We expected partner compatibility effects in both SR groups, specifically in Simon-incongruent trials, but no influence of the partner in the Goal group. The results revealed an interaction of partner compatibility and Simon congruence, but not in the expected way. Partner effects were absent regardless of Simon congruence. However, when the partner moved to the opposite direction, Simon interference was stronger, indicating increased susceptibility to irrelevant spatial information. There was no interaction with group. However, in the SR groups, individual participants' Simon effects seemed affected by partner reactions in opposing ways, whereas in the Goal group, most participants' Simon effects were completely indifferent to partner reactions. Thus, abstraction in action coding might affect susceptibility to distraction, but in more complex ways than expected.

Keywords: response-effect compatibility, abstraction, action goals, social action effects, Simon task
Presentation type: Oral presentation / Talk
Session: Joint Action

How actions structure objects in scenes and in our minds.

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We constantly interact with our environment. We have therefore organized objects in these environments such that they serve our daily activities. For example, the toothbrush we usually store close to the toothpaste and both are located above the sink where we brush our teeth. The sink therefore “anchors” predictions about the identity and location of smaller objects that we tend to interact with forming meaningful and functionally relevant sub-units of scenes, so-called "phrases". We believe that this hierarchical structure of objects in scenes is action driven and strongly engrained into the mental representations of our world. In this talk, we will highlight recent work from the lab that provides further evidence for the strength of actions in structuring both our environment and our mental object representations. For instance, we will show that so-called anchor objects – which are usually larger, and stationary – guide both attention and actions in 3D virtual environments, particularly when the objects we want to interact with are not visible and require opening cabinets or drawers. They are also key components of a scene when judging its action affordance up to the point that their presence in a scene affects lexical decision judgments of action words. Recording EEG while participants were presented with isolated objects further revealed that the representational space of objects decoded from brain activity closely follows the hierarchical structure we propose for visual scenes. It therefore becomes increasingly clear that actions structure not only objects in scenes but also in our minds.

Keywords: Scene perception, object representations, action affordances, hierarchical processing
Presentation type: Oral presentation / Talk
Session: Cognitive and Neural Processes Underlying the Perception of Actions, Scenes and Objects I

Object Presence Informs Scene Affordance Estimations

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Efficiently engaging with the objects in our surroundings comes naturally to us, as their design enables effortless action completion. Functionally related objects are close, and at the centre of these object clusters, we find anchor objects predicting the presence and location of surrounding local objects. However, scenes are suggested to be best categorized by their function rather than the objects they contain.
To investigate whether the hierarchy in scenes informs affordance understanding, we studied the role of anchor presence.
In two studies, participants decided whether action words (e.g., “washing hands”) and scenes presented on screen matched. The scenes could either be missing related anchors (REL; sink), unrelated anchors (UNREL; toilet) or random objects (RAND; mirror). In the first series of experiments, participants saw photographs of real scenes, manipulated by scrambling the pixels of the respective objects, while the second study included 3D rendered scenes in which objects were removed entirely. Participants were consistently less accurate and slower in REL conditions but significantly faster and more accurate in UNREL and RAND trials.
To control for confounding factors and ensure the comparability of the results discussed above, we conducted a scene categorization task on both types of scenes, lacking anchors and random objects. No interaction of scene type and object missing was observed, suggesting similar responses to both stimuli regarding the effect of object removal.
These studies suggest that affordance understanding relies on object-level rather than scene-level information. Scene affordance appears to be strongly determined by the objects a scene contains.
Keywords: scene perception, affordances, scene grammar, actions
Presentation type: Poster Presentation
Session: Perception II

Bound to a place? Disentangling two types of locations in S-R binding

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In the field of action control, stimulus-response binding and retrieval processes are assumed. When occurring in a common stimulus-response episode, features of both stimulus and response are integrated into a common event file. This event file is retrieved when at least one of the features involved is repeated. If features of the previous and current episodes only partially match, interference between the retrieved previous and current response must be resolved, resulting in performance costs (measurable as S-R binding effects). One feature for which binding effects occur, but which seems to differ from other features like color or shape in certain situations, is location. In two experiments (cumulative n = 77), we tried to make a context-dependent distinction between different forms of the feature location and its different implications for binding processes.

Keywords: action control, S-R binding, feature binding, location
Presentation type: Oral presentation / Talk
Session: Episodic Binding

The Environment as a Factor: Exploring the impact of sunny and rainy weather on word recognition with Virtual Reality

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The environment constantly provides sensory input, affecting the way individuals perceive and process information. Factors like noise, distractors, and the characteristics of the stimuli impact the ability to focus on specific tasks and can influence cognitive performance, culminating in traditional research experimental psychology research being done mostly in minimalistic environments. Controlling natural phenomena, such as weather patterns, ambient lighting, or spatial configurations can present significant challenges to researchers seeking to isolate specific variables for systematic investigation, making some investigations impractical and others unfeasible. However, the synthetic recreation of environments with Virtual Reality (VR) has engendered a paradigm shift in experimental methodologies, affording investigators the capability to mimic and modulate environmental conditions with unprecedented precision, through the generation of highly controlled experimental scenarios. We present evidence on visual contrast and weather disturbances on words recognition speed and error rates using this technique, fostering virtual immersion to approximate laboratory conditions to ecological.

Keywords: Virtual Reality, Ecological validity, Word recognition, Visual perception
Presentation type: Poster Presentation
Session: Human Factors I

My campus in my mind: Cognitive maps after a distracted outdoor visual search

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In the current study, we explored whether and to what extent different types of distraction affected cognitive maps of a campus environment. A total of 48 participants engaged in a visual search task across eight locations on our university campus. They were randomly assigned to four groups: search only (control), searching under auditory distraction, searching under executive working memory load, and searching under time pressure. Following the search, two memory tests were administered. The first memory test required participants to recall the searched targets (both absent and present) and their corresponding search locations (from one to eight). In the second memory test, participants were tasked with drawing a map of the campus, including all observed buildings, marking the locations of the searches and the path they walked. Results show tendencies that participants who searched under time pressure performed the worst on the drawing task, while participants who listened to a podcast while searching (auditory distraction) seemed to have the best mental representation of the campus afterwards. Furthermore, the more errors participants made in the search task, the less accurate the drawings of the campus were. There was also a relation to the first memory test: participants whose drawings were less accurate also remembered less of the locations of search targets. Overall, these results reinforce the importance of the interplay between distraction, attention, and memory.

Keywords: distraction, cognitve map, visual search, drawing, memory
Presentation type: Poster Presentation
Session: Memory and Learning I

Integrative processing in artificial and biological vision predicts the perceived beauty of natural scenes.

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Previous research strongly suggests that whether we assign beauty to natural images is already decided during perceptual analysis. However, it is still largely unclear which perceptual computations give rise to the perception of beauty. Theories of processing fluency suggest that the ease of processing for a specific stimulus determines its perceived beauty. Here, we tested whether perceived beauty is related to the amount of spatial integration across an image, a perceptual computation that reduces processing demands by aggregating image elements into more efficient representations of whole images. We reasoned that increasing amounts of integration reduce processing demands in the visual system and thereby lead to an increase in perceived beauty. We quantified integrative processing in an artificial deep neural network model of vision: We compared activations between parts of the image and the whole image, where the degree of integration was quantified as the amount of deviation between activations for the whole image and its constituent parts. This quantification of integration predicted the beauty ratings assigned to images across four studies, which featured different images and task demands. Complementary fMRI recordings revealed that the integration in human visual cortex predicts perceived beauty in a similar way as integration in artificial neural networks. Together, our results establish integration as a computational principle that eases perceptual analysis and thereby predisposes the perception of beauty.

Keywords: Integration, Neuroaesthetics, DNNs, fMRI
Presentation type: Oral presentation / Talk
Session: Natural Scene Perception

Cross-modal matching of brightness and loudness and internal references

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'Make the light as bright as the sound is loud.' This is a typical instruction in experiments dealing with the cross-modal matching of stimuli. According to the theory of global psychophysics (Luce, Steingrimsson, & Narens, 2010; Heller, 2021), in such a cross-modal task, the perceived stimulus intensities are judged against respondent-generated internal reference intensities, all represented on a common psychological scale. The internal references are distinguished with respect to their role in the experimental setup, that is, whether they pertain to the standard or to the comparison stimulus in the matching task.

By testing the theory of global psychophysics on cross-modal data, the present study aims at thoroughly investigating the role-sensitivity of the internal reference intensities. Therefore, we replicate a classical experiment by Stevens and Marks (1965), whose participants adjusted the brightness of a light to the perceived loudness of a noise sound and vice versa. Complementing the traditional group-level analysis, we evaluate and model the data on the individual level. We find that the cross-modal matching curves differ in slope, and show a regression effect as reported in the classical literature.

In order to experimentally manipulate the internal references' role-(in)dependence, we discuss a paired comparison task with an adaptive staircase procedure as psychophysical method. With it, the subject is instructed to indicate the more intense stimulus. So there is no 'standard' or 'comparison' stimulus for the subject and the internal references are expected to be role-independent. As a result, the 'regression effect' should vanish.

Keywords: cross-modal matching, psychophysics, cognitive modeling, adaptive staircase
Presentation type: Oral presentation / Talk
Session: Crossmodal Perception / Synesthesia

Learning cues for metamemory judgments through statistical learning

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In metamemory research, it is well stablished that metamemory judgments are inferences made based on cues. Several cues have been found to underlie predictions of future memory performance – judgments of learning (JOLs) – such as concreteness, emotionality, etc. However, little is known about specific mechanisms for learning cues. To explore this gap, we tested statistical learning as a mechanism to extract regularities from the environment and use them as cues to inform JOLs. Across two experiments, participants were exposed to a continuous auditory stream of artificial words with fixed transitional probabilities between adjacent syllables. Afterwards, they studied and made JOLs for items that 1) were presented in the stream (word), 2) were not presented in the stream, but followed transitional probabilities (phantom), and 3) did not follow transitional probabilities (non-word). Results showed that JOLs were based on the transitional probabilities: JOLs were higher for word and phantom than for non-word items. In Experiment 1, using an old-new recognition memory test, discrimination was worse for word and phantom than for non-word items. In Experiment 2, using a 2-alternative-forced-choice recognition memory test with the same type of target and distractor item in each trial, performance did not vary across trial types, but there were group differences depending on whether statistical learning was assessed during learning or not. Hence, linguistic cues for JOLs can be acquired through statistical learning, but such cues are not necessarily valid and may lead to metamemory illusions.

Keywords: Metamemory, Judgments of Learning, JOLs, Statistical Learning
Presentation type: Oral presentation / Talk
Session: Recent Insights on the Basis, Accuracy, and Impact of Metacognitive Judgments

Effects of recency and practice on habitual behavior

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Habitual behavior is characterized by responses elicited by stimuli without deliberation or reliance on the predicted value of the outcome. We developed a reinforcement-learning task based on computational models suggesting that habit strength is proportional to the frequency of the behavior. We analyzed data of 220 participants who practiced our task on each of five consecutive days, with a test phase on the fifth day. Linear mixed-effects models revealed that choice frequency during training significantly increased choice probability and decreased response times during the test session (Nebe et al., under review). Recently, a competing model was formulated that could explain the results by an effect of recency instead (Giesen et al., 2020). In a secondary analysis of this dataset, we tested effects of recency against this effect of frequency. Additional mixed-effects models revealed statistically significant effects of recency on choice and reaction times: participants responded faster and had a higher probability of choosing a stimulus if they chose it at its last occurrence, but neither stimulus location nor number of trials since its last occurrence were meaningfully associated with choice or reaction times. Combining the effects of recency and frequency in the same model did not change the results of separate models of either effect. Thus, both choice frequency during training and choice at its last occurrence during testing influenced choice and response times in the same direction, but surprisingly these effects were uncorrelated and did not interact. These results suggest separate effects of past frequency and recency.

Keywords: habit, value-based decision making, reinforcement learning, choice frequency, recency
Presentation type: Oral presentation / Talk
Session: Episodic retrieval of recent stimulus-response episodes as a source of cognitive control and learning

Ideomotor effects in response-response binding: Responses do not need to be executed to retrieve other responses.

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Executing a response results in bindings between features of present stimuli and features of the response. If features in an event file then repeat in a later episode, the whole event file is retrieved and can affect the following action (so called binding effects, Hommel et al., 2001; Frings et al., 2020). Binding seems not only to play an important role in the control of simple individually planned actions (stimulus-response binding; Moeller & Frings, 2019) but also in coordinating more complex actions (response-response binding). While it is typically assumed that the execution of an action leads to binding with and retrieval of other responses, the ideomotor principle would suggest that the perception of a stimulus directly triggers an activation of the associated response. In this study (n=60), we used an adapted response-response binding paradigm and investigated whether response execution is necessary to trigger retrieval of a bound response. The findings indicate that both the execution of responses and the mere presentation of a stimulus that is associated with the retrieving response led to response-response binding effects. Apparently, activating the cognitive representation of a response suffices for this response to trigger retrieval of other bound features.

Keywords: action control, binding and retrieval, response–response binding, ideomotor theory
Presentation type: Poster Presentation
Session: Motor and Action Control

Tactile tuning after brief deprivation

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Plasticity in the sensory systems is a well-established phenomenon. For instance, plasticity in the visual system is reflected in the enhanced visual sensitivity of an eye that was previously visually deprived or received delayed or unreliable visual information. But does that also apply to the tactile sensory system? We hypothesized that unreliable tactile input provided to one hand should lead to enhanced tactile perception on that hand. To examine this, participants performed a brief tactile discrimination task with reference and test stimuli presented on their left and right index fingers, respectively. Following this initial baseline measure of tactile sensitivity, participants performed a 60-minute intervention, during which they built blocks using LEGO of different shapes and sizes with their right hand that was wearing a thick ski glove. Their left hand was bare and did not participate in the task. Immediately after this intervention, we re-tested tactile sensitivity at five consecutive time points. Our data showed enhanced tactile sensitivity during the first two minutes after the intervention; this effect vanished afterward. As we controlled for skin temperature we can rule out a potential influence. In sum, our findings suggest that the human tactile system has a considerable degree of plasticity following short exposure to unreliable tactile input, but unlike the visual system, this plasticity is rather short-lasting.

Keywords: sensory plasticity, tactile perception, sensory deprivation, sensory tuning
Presentation type: Poster Presentation
Session: Perception I

Embodied Cognition in dynamic Multitasking: Movement towards versus away from the Task 2 stimulus determines between-task interference

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The study of embodied cognition examines how body posture influences cognitive processing and the use of body movement as part of the cognitive system. While there is evidence on the influence of body position on task processing in static experimental set-ups, i.e. stimulus-hands proximity effects, little is known about the influence of dynamic movement in this context. In three dual-task experiments the present study investigated the impact of a left versus right movement response in Task 1 (R1) on between-task interference when moving either towards or away from a laterally presented stimulus in Task 2 (S2). In conditions of identical task sets (i.e., number categorization in both tasks) response-time analysis showed increased between-task interference when participants had to move towards S2 as when they moved away from S2. This pattern occurred for both predictable (Experiment 1) and unpredictable S2 location (Experiment 3). However, with different task sets in each task the hand movement effect disappeared altogether (Experiment 2). Mouse-tracking analyses revealed that specific R1 movement parameters accompanied the hand movement effect. Together, our results suggest that task shielding in Task 1 was improved when the movement of the Task 1 response was directed away from the Task 2 stimulus than towards the Task 2 stimulus. Results are discussed in the context of stimulus-hands proximity effects in embodied cognition.

Keywords: embodied cognition, dual task, dynamic movement
Presentation type: Oral presentation / Talk
Session: Embodied Cognition

To-be-forgotten information shows more relative forgetting over time than to-be-remembered information

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Research into item-method directed forgetting has demonstrated that participants can intentionally forget studied items when they are asked to do so immediately following initial presentation. In spite of its long research history, it is still largely unclear whether the impaired retention of to-be-forgotten (TBF) materials compared to to-be-remembered (TBR) materials is a lasting effect and whether time-dependent forgetting varies for the two item types. To assess this, we investigated memory performance of both item types at four retention intervals spanning from 3 min up to 1 week. The resulting recall (Experiment 1) and recognition (Experiment 2) rates were then fitted with power functions of time. Memory performance of the TBR items exceeded that of the TBF items in both experiments and at all retention intervals, indicating sustained effects of directed forgetting. Across both experiments, retention data were well described by the power function. Crucially, the function's forgetting rate parameter was found to differ significantly for the two item types, with increased forgetting of TBF compared to TBR items. The findings support the assumption of an involvement of rehearsal processes in item-method directed forgetting, indicating that TBR and TBF items differ in memory strength and do so over prolonged retention intervals.
Keywords: episodic memory, forgetting, directed forgetting, time-dependet forgetting
Presentation type: Poster Presentation
Session: Memory and Learning III

Attitudes by Choice: Sampling's Impact on Evaluations of Valent and Neutral Stimuli

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Traditional evaluative learning paradigms require participants to passively view and learn about pairs of stimuli, stripping people of the autonomy they typically have in everyday life. However, recent work incorporating autonomy into an evaluative conditioning task suggests autonomy can have consequential impacts on evaluations: sampling an initially-neutral conditioned stimulus (CS) more frequently predicted a positive shift in high-autonomy participants' evaluations of it, regardless of whether the CS was consistently paired with positive or negative unconditioned stimuli (USs). The current work tested whether this sampling decision effect extended to clearly valent stimuli by modifying the paradigm to also measure participants' evaluations of the USs. Two experiments (N = 553) replicate the sampling decision effect for CSs but find it does not extend to the paired USs. The experiments also rule out an alternative explanation for the effect on CSs, demonstrating that it cannot by explained by idiosyncratic variance in high autonomy participants' evaluations of the USs. As such, this work further suggests the act of choosing to sample a stimulus more frequently predicts a positive evaluative shift toward it.
Keywords:
Presentation type: Oral presentation / Talk
Session: Current Developments in Evaluative Conditioning: Methodologies, Mechanisms, and Manifestations

Understanding the dynamics of serial dietary decisions through the lens of sequential sampling models

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Universität Hamburg

In our daily lives, we often take sequential actions rather than making single, isolated decisions. A typical example is deciding which items we want to put in our shopping basket. Previous studies have investigated the temporal dynamics of these sequential decisions using a virtual shopping paradigm (Wolf et al., 2018, 2019, Front. Psychol.; Xu et al., 2023, Front. Psychol.). Specifically, these studies have examined the probability of accepting or rejecting different food items as well as the speed of those dietary decisions with various constraints. However, the cognitive mechanisms of the underlying sequential decision dynamics have not been addressed.

Here, we replicate and extend the study by Xu et al. (2023) using their paradigm in an online study, in which n = 100 participants decided for sequentially encountered items whether or not to add them into their shopping basket. In one condition, participants could also defer the choice. The number of food items that could be added to the basket was manipulated between subjects.

To elucidate the cognitive mechanisms, we evaluate various evidence-accumulation models that are specifically tailored to sequential decision problems, testing how well they can provide a comprehensive account of the reported choice and response time patterns. Simulations with these models suggest a pivotal role of the starting point of evidence accumulation, which is biased towards reject decisions. This allows to explain why reject decisions are faster than accept decisions, and why this difference is modulated by the size of the shopping basket.

Keywords: sequential sampling models, serial decision making, choice deferral
Presentation type: Oral presentation / Talk
Session: Decision Making I

Skewness Preference and Frequent Winners in Decisions from Experience

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Do people's attitudes towards the (a)symmetry of an outcome distribution affect their choices? Financial investors seek return distributions with frequent small returns but few large ones, consistent with leading models of choice in economics and finance that assume right-skewed preferences. In contrast, many experiments in which decision makers learn about choice options through experience find the opposite choice tendency, in favor of left-skewed options. To reconcile these seemingly contradicting findings, the present work investigates the effect of skewness on choices in experience-based decisions. Across seven studies, we show that apparent preferences for left-skewed outcome distributions are a consequence of those distributions having a higher value in most direct outcome comparisons, a ``frequent-winner effect''. By manipulating which option is the frequent winner, we show that choice tendencies for frequent winners can be obtained even with identical outcome distributions. Moreover, systematic choice tendencies in favor of right- or left-skewed options can be obtained by manipulating which option is experienced as the frequent winner. We also find evidence for an intrinsic preference for right-skewed outcome distributions. The frequent-winner phenomenon is robust to variations in outcome distributions and experimental paradigms. These findings are confirmed by computational model analyses in which a reinforcement-learning model capturing intrinsic skewness preferences and frequent winning provides the best account of the data. Our work reconciles conflicting findings of aggregated behavior in financial markets and experiments, and highlights the need for theories of decision making sensitive to joint outcome distributions of the available options.

Keywords: risky choice, risk taking, decision making, decisions from experience, risk preference, economic psychology, cognitive models
Presentation type: Oral presentation / Talk
Session: Decision Making II

Preschoolers' emotion regulation is associated to their inhibitory control

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Background: Inhibition develops rapidly in the preschool period and plays an important role in different aspects of children's functioning: they learn how to control their attention, emotional expressions, and impulsiveness in different situations. There is a lack of examination of preschool children's performance on behavioural measures that call for inhibition of action in direct linking with those that call for inhibiting an emotional expression. Aims: The aim of our pilot-study was to explore the possible relationship between inhibitory control and emotion regulation, more precisely the expressive control. Method: 29 Hungarian children participated in our research (Mage: 66,33 months; SD= 10,82; min: 47; max: 87; 13 boys). To investigate inhibitory control, we used the Go/No-go task from Early Years Toolbox. To measure expressive control, we used the disappointment paradigm. Results: We used the reactions of the disappointment paradigm as a grouping variable. Children, who reacted positively or neutrally to the undesired gift, they formed the group of "regulators". Children with negative reaction formed the group of "non-regulators". We used the hit score and false alarm score of the Go/no-go task. After the results of binomial logistic regression, false alarm reduces the probability of inclusion in the "regulators" group ($\chi 2(1)=6,26$; $p=0,012$; Odds ratio=0,0016). The hit had no effect ($\chi 2(1)=0,0007$; $p>0,05$). Implications: There is an ongoing data collection. These preliminary results showed that children with higher impulsivity regulate less their emotional expression. The findings lead us to further consideration of the connection between inhibition and emotion regulation.

Keywords: inhibition, inhibitory control, impulsivity; emotion regulation, preschool
Presentation type: Poster Presentation
Session: Cognitive Control and Conflict I

The Neurocognition of Liveness

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Watching live dance, theatre, or music events is an inherently social activity in which people often share a highly emotional experience. Yet, neuroscientific research into music or dance cognition and appreciation has been almost exclusively conducted on individual people in a lab setting. Across three live performances of a dance choreography ('Detective Work') we measured real-time dynamics between the brains of large audience groups. We recorded 32-channel mobile EEG and respiratory activity from up to 23 audience members simultaneously (total N = 69) and assessed the spectators' engagement with the performance. Additionally, the Performer/Choreographer provided continuous ratings of expected audience engagement while watching the video recording of each performance. We computed inter-brain correlations to measure brain synchrony between audience members relative to an active resting-state baseline. Audience EEG synchrony was highest in the delta frequency band during the performances and varied with the structural features of the choreography. Sections involving greater movement complexity and direct audience interaction ('breaking the fourth wall') showed significantly higher synchrony than resting-state and were rated significantly higher for engagement by an independent audience sample.Granger Causality analyses showed that the dancers' movements and the choreographer's intention to direct collective attention were the best predictors of delta band synchrony over time, outperforming changes in music or lighting. Our findings show that audience engagement during a live performance is measurable as artistically directed, collective attention between co-present spectators.

Keywords: Hyperscanning, Neuroaesthetics, Dance
Presentation type: Oral presentation / Talk
Session: Experimental Aesthetics II

Can cosmetic surgery be considered as a mean of intrasexual competition for women?

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As physical attractiveness plays an important role in human mating, women try to look as attractive as possible. Women use their attractive appearance both to impress men and to outdo their female competitors. In this competition, they even use cosmetic interventions to achieve the socially attractive slim figure. The present study investigates the openness to cosmetic surgery in the context of intrasexual competition among Hungarian women. 514 heterosexual women (Mage=23.5, SDage=6.72, 18-72 years) filled an online questionnaire package containing the Acceptance of Cosmetic Surgery Scale (ACSS), Beliefs About Attractiveness Scale-revised (BAA-R), Body Responsiveness Questionnaire (BRQ) and Intrasexual Competition Scale (ICS). First, they read a story accompanied with one picture. We used three different pictures one of which was randomly showed to the respondents. Differences between groups were measured by analysis of variance and a General linear model was used to examine the evolution of the level of general acceptance of cosmetic surgery depending on the measured variables. There were no differences between the groups. The story and pictures weren't strong enough to induce a change in any of the measured variables. Based on our results, the higher openness to cosmetic surgery is predicted by higher motivation for intrasexual competition, increased importance of fitness and attractiveness, and a lack of body awareness. Overall, women who are more intrasexually competitive, who try to meet social expectations without sparing time and energy, and who pay less attention to their body's cues are more likely to use cosmetic surgery to enhance their physical appearance.

Keywords: cosmetic surgery, intrasexual competition, body responsiveness, body image, attractiveness, social expectations
Presentation type: Poster Presentation
Session: Clinical and Biological Psychology

From Verbal Reports to Model Validation: Theoretical Framework and Application

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In this talk we introduce a novel theoretical framework that merges verbal reports with computational cognitive models. This approach takes advantage of the context-sensitive features of advanced Natural Language Processing (NLP) models to analyze participants' verbal descriptions about their problem-solving strategies. We will use a JavaScript-based plugin that complements a JsPsych library that we recently developed. This tool enables real-time speech recognition, where spoken reports are automatically converted into text and analysed using large-language models, greatly reducing the typical burden of analysing self-report data. Our goal is to use these verbal descriptions to validate the formal components in our models, while also exploring their more implicit assumptions.

Keywords:
Presentation type: Oral presentation / Talk
Session: Computational modeling in experimental psychology: Linking model-based and processtracing analyses

Identification of Facial Information Used for Emotion Recognition in Children and Adolescents with Non-Suicidal Self-Injurious Behavior, utilizing ResNet50 Models and Layerwise Relevance Propagation for Analysis

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Approximately 18-22% of adolescents engage in non-suicidal self-injury (NSSI). While the consequences of NSSI are well-documented, emotion recognition mechanisms in NSSI and which facial information's are used remain unclear. Therefore, this study explores the emotion recognition process preceding NSSI. Participants, comprising 42 patients and 43 controls, judged images of faces for emotional or neutral expressions across sessions featuring happy and sad valences. Employing the bubble technique, gaussian apertures at random locations unveiled different facial areas in distinct spatial frequencies in each trial for emotion classification. With over 33,000 trials per group and valence, images from correct emotion classification were used to train an image classifier (ResNet50) distinguishing emotional vs. neutral facial expressions. Cross-validation demonstrated deviating performances between the NSSI and control model in classifying sad facial expressions, with the NSSI model misclassifying sad expressions more frequently as neutral. Through layer-wise relevance propagation, facial features around the left eye and mouth regions were identified as contributors to the lower accuracy of emotion perception in the NSSI model. Conversely, the right eye and forehead region contributed to a more accurate classification of the control model. Further analyses revealed components of emotional competence, particularly attitudes towards emotions, as predictors for the non-utilization of specific facial regions for classification of sad expressions. The observed disparity in identifying sad emotions suggests a potential avoidance strategy at perception among adolescents with NSSI, wherein visual facial information related to sad emotions might be disregarded as a mechanism for emotion regulation and a divergent attitude toward emotions.

Keywords: Emotion Perception, NSSI, machine learning
Presentation type: Oral presentation / Talk
Session: Innovative methods for assessing emotion recognition, interoception and stress processing in children and adolescents

Evaluating the transparency and consistency of methods in developmental dyslexia studies

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Transparency and methodological rigour have been proposed as important contributors to overcoming the replication crisis in psychological science (e.g., Asendorpf et al., 2013). In order to conduct a replication study, and to obtain similar results, we need a complete description of the experimental methods. To compare studies testing identical hypotheses, the studies furthermore need to have the same research methods (Elson, 2019). Here, we focus on studies testing the Temporal Sampling Framework (Goswami, 2011), a causal theory of developmental dyslexia. We first design and evaluate a transparency rating scale, specific for theories of developmental dyslexia and similar research questions. Then, we conduct a meta-methods analysis to examine the variability in the implementation of the experimental paradigms. We found substantial variability in the transparency of the methods. When the methods were described in a detailed way, there was variability in the implementation of the paradigm. Our transparency rating scale can help researchers to include a more complete description when writing a methods section. We conclude with the recommendation of conducting direct replications instead of conceptual replications, so that the methods are kept constant to establish the robustness of a given effect (Simons et al., 2014) and taking methods in addition to results into closer consideration when conducting meta-reviews.

Keywords: Dyslexia; meta-science; transparency
Presentation type: Oral presentation / Talk
Session: Methods in reading and language research

Predicting dual-task performance from individualized functional and structural networks

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Dual-tasking is linked to fronto-parietal brain activity [1], and accounting for inter-individual variability in functional (FC) and structural connectivity (SC) between brain regions may be informative for individual performance [2-4]. Here, we aimed to predict dual-task performance from FC and SC in individualized task-specific (TS-N) and whole-brain (WB-N) networks.
In addition to standard, non-individualized connectivity measures, individualized FC and SC were derived from 41 young and 30 older adults by implementing an iterative cortical parcellation based on functional connectivity patterns [3,4]. Subject-level reaction time in dual-tasking was predicted via four regression models and a cross-validation approach based on eight separate feature spaces (FC vs. SC × TS-N vs. WB-N × indiv. vs. non-indiv. networks).
The best predictions were achieved with individualized structural TS-N and WB-N, followed by functional individualized and non-individualized WB-N. Predictability was lowest for the individualized functional TS-N.
This study revealed that considering inter-individual variability in functional brain organization via an individualized parcellation approach marginally improved dual-task performance prediction, aligning with previous studies showing limited prediction accuracy [5,6]. Additionally, WB-N outperformed TS-N, suggesting the significance of global brain organizational properties in brain-behavior associations [5,6].

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Keywords: dual-tasking; inter-individual variability; functional connectivity; structural connectivity; machine learning
Presentation type: Poster Presentation
Session: Methods

An affect-based computational framework for modeling risky choice with nonmonetary outcomes

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The development of formal models of decision making under risk has been shaped largely by decisions between options with monetary outcomes, with the most prominent model being cumulative prospect theory (CPT). Whereas CPT is good at describing choices between monetary lotteries, it shows poorer performance in the context of decisions between options with nonmonetary and nonnumerical outcomes (e.g., medications with possible side effects). We suggest that this may be due to affective processes and context-dependent evaluation—which are not considered in CPT—playing a larger role in nonmonetary than in monetary choice. We propose three psychologically motivated modifications to CPT's modeling framework to capture these differences: (a) representing the subjective value of a nonmonetary outcome by an affect rating (rather than a monetary equivalent); (b) determining the subjective affective value of an outcome relative to the value of the worst outcome in the choice problem; (c) assuming that the probability weighting for an outcome depends on the amount of affect triggered. We submit model variants of CPT implementing the proposed modifications to a model comparison in three empirical data sets. For choices between options with negative nonmonetary outcomes (medications with possible side effects), these modifications substantially improve CPT's performance relative to that of the original version of CPT. The same does not hold for monetary choices. Overall, in addition to fleshing out key differences in the processing of monetary and nonmonetary risky options, our work demonstrates how affective processes can be formally integrated within classical theories of decisions under risk.
Keywords: decisions under risk, risky choice, cognitive modeling, affect, computational modeling, decision making
Presentation type: Oral presentation / Talk
Session: Decision Making I

Pathfinder: Exploring How Phrasing Influences Success in a Wayfinding Task

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Numerous languages, including Hindi, German, and (Old) English, have so-called correlative structures, which combine a question word with a demonstrative pronoun (e.g., *'Where X is, there you will find Y'*). The structure seems to draw attention to the referent of the demonstrative ('*there*'). We investigated this hypothesis in a wayfinding experiment. Ninety-nine German participants saw three scenarios, each consisting of written directions and a map showing three possible destinations. For each German text, we identified a crucial sentence providing information on which direction to take at a junction, and created three versions, differing only in phrasing (canonical: '*Turn right at X*', implicitly salient correlative: '*There where X is, there you must turn right*', and explicitly salient: '*You must pay attention here: On seeing X, you must turn right*'). Each participant was presented with one of the three phrasings in each of the three scenarios. Following the main task, participants completed a sentence-recognition task. All conditions were counterbalanced across participants and scenarios. We observed a significant effect of sentence recognition on selecting the correct destination, but phrasing did not show any significant effect. A post-hoc-analysis revealed a significant effect of phrasing on sentence recognition: Memory was best for the explicitly salient sentence. We conclude that specific phrasing can indeed draw attention to a sentence, but this is not particularly the case for correlative structures and does not seem to be strong enough to influence performance in a wayfinding task.

Keywords: Language, Memory, Attention
Presentation type: Poster Presentation
Session: Language

Short-Term Transfer Effects of Tetris on Mental Rotation: Review and Registered Report – A Bayesian Approach

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The existence of transfer effects of video games on cognitive performance are controversially discussed in experimental psychology. Whereas recent meta-analyses suggest the absence of far transfer effects, empirical evidence regarding near transfer effects is more controversial. We performed a conceptual replication investigating the near transfer effect of playing Tetris on mental rotation abilities. In our study, 366 participants were randomly assigned to either an experimental group playing Tetris or a control group playing Solitaire. Both groups completed three commonly used mental rotation tests in a pre- and a posttest-session. Participants played the assigned game for 10 hours in total within a maximum of 4 weeks. We took a Bayesian approach that allowed us to evaluate the strength of evidence in favor of either the H0 (no transfer of playing Tetris on mental rotation abilities) or the H1 (playing Tetris affects mental rotation abilities). While participants showed a repeated testing effect for the mental rotation tests in both groups, we found evidence that playing Tetris does not produce a near transfer effect on mental rotation abilities. Gender did not influence this effect. Our study suggests that playing Tetris does not improve mental rotation skills.
Keywords: transfer effect, video games, mental rotation, Tetris
Presentation type: Poster Presentation
Session: Methods

Revisiting the role of retention interval for the forward testing effect

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The forward testing effect (FTE) is a phenomenon where testing previously learned information enhances memory for subsequently acquired new information. Recent research has indicated that the FTE may persist when the previously learned and the new information are semantically related but might diminish after a 25-minute retention interval for unrelated material. In this study, we re-examined the impact of retention interval on the FTE using unrelated word lists. A total of 128 participants studied three lists of unrelated words in anticipation of a final cumulative recall test. Participants were tested immediately on lists 1 and 2 (testing condition) or restudied lists 1 and 2 after initial study (restudy condition). Following the study of the critical third list, a retention interval of either 1 minute or 25 minutes was imposed before recall testing for this list. The results of the list 3 criterion test demonstrated a significant main effect of retention interval, with lower recall rates after the longer (25-minute) interval compared to the shorter (1-minute) interval. More importantly, the FTE was consistently observed in both the short and long retention interval conditions, which contrasts with the previous research findings. We conducted further analysis of the role of the retention interval through a meta-analysis of FTE studies and discuss our results in the context of current FTE theories.
Keywords: episodic memory, retrieval practice, forward testing effect, retention interval
Presentation type: Oral presentation / Talk
Session: Test-enhanced learning

Manipulating Memory Strength and Expectancy Violation to Trigger Memory Reconsolidation

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Numerous research in both human and non-human domains have explored the topic of how expectancy violation affects memory by triggering memory reconsolidation. These violations have shown enhanced efficacy in exposure therapies. However, reconsolidation intervention success is highly dependent on the destabilization of memory and hence cannot be guaranteed. Determining the prerequisites for instability is one of the important problems in the area. In this study, our goal was to demonstrate how prediction error and memory strength (Reinforcement level) affect destabilization of memory. We generate prediction error using UCS reactivation. Sixty participants were tested on a three-day fear conditioning paradigm: acquisition (50% and 100%) on Day 1; UCS Reactivation or control on Day 2; extinction learning and reinstatement on Day 3 where data was recorded using SCR and subjective measures. We found that UCS reactivation could generate greater expectancy violation even for stronger memories. The failure of fear return can be explained by reduced valency of UCS as found in the valence ratings and increased discrepancy in expectations. Hence, the study indicates that memory reconsolidation depends on the strength of fear memory as well as the prediction error generated. The study further helps in increasing therapeutic efficacy of anxiety disorders and Post-Traumatic Stress Disorder.

Keywords: expectancy violation, memory strength, memory reconsolidation, UCS reactivation
Presentation type: Poster Presentation
Session: Memory and Learning I

Seeing the invisible: Online use of rich physical constraints in perception

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Massachusetts Institute of Technology

Visual perception of dynamical physical properties, such as viscosity or softness, is tricky: The observable behavior of an object depends on both its internal properties as well as external factors. For instance, how much an object deforms depends on its internal structure (compliance) and the force applied to it. Thus, the brain needs to disentangle and interpret the interplay of many scene factors. What if these external scene factors were invisible? Here we test this idea using computer graphics. Specifically, we simulated short sequences of different types of materials (liquid, granular, non-rigid) interacting with various rigid objects. Crucially, only the target material/object was rendered, not any of the surroundings. Observers were as accurate in matching the material properties in these reduced stimuli as in a control task with fully rendered videos of the same interactions. Strikingly, we found that observers did not just perceive the target material in rich detail, but also perceived physical 3D objects the material was interacting with. In fact, observers were able to accurately select the underlying invisible shape in an asymmetric matching task. These results can be understood if the brain imputes the hidden objects in a physically accurate manner. Thus, our results are consistent with the hypothesis that people use an internal generative physics model online in perception. In contrast, we found that artificial neural networks trained on object or motion recognition show lower accuracy in jointly estimating material properties and object shape and their underlying representation is inconsistent with that of human observers.

Keywords: perception, cognition, vision, intuitive physics, material perception
Presentation type: Oral presentation / Talk
Session: Seeing, Thinking, and Acting in a Physical World

Can the self-prioritization effect be reduced to the polarity principle?

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Since the first publication of the self-prioritization effect (SPE; Sui et al., 2012), researchers have been trying to understand the cognitive processes underlying this effect. Here, we assume that the effect can (at least partially) be explained by the *Polarity Correspondence Principle* (Proctor & Cho, 2006). This principle states that in binary classification tasks participants arrange the stimulus alternatives and response alternatives on plus and minus poles, respectively. Responses are faster if stimulus and response poles correspond. Applied to the SPE, in matching self-related trials all plus polarities meet (i.e., self-label, self-shape, yes response). To test this assumption, participants learned to associate geometric shapes with a self-relevant and one other-relevant label (Experiment 1) or two different other-relevant labels (i.e., the more common version of the paradigm; Experiment 2). In a between-design, participants were instructed to affirm either “mono-combinations” (label-shape combinations where label and shape refer to the same person) or “duo-combinations” (label-shape combinations where the label refers to one and the shape refers to another person). Thus, according to the polarity rationale, matching self-related trials are still “+++” in the “mono” condition, but “++–” in the "duo” condition. Accordingly, in the “mono”-block we found a clear SPE in both experiments. In the “duo” block, however, the SPE disappeared (Experiment 1) or was significantly reduced (Experiment 2). These results suggest that a substantial part of the SPE can be explained by the Polarity Correspondence Principle.

Keywords: self-prioritization, polarity, self-bias
Presentation type: Poster Presentation
Session: Metacognition

Event segmentation of dynamic maps: The influence of viewer expectations and map design

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Dynamic thematic maps allow the communication of complex real-world phenomena through comprehensive spatio-temporal virtual displays. Our research applies Event Segmentation Theory (EST) to investigate their perception and processing. EST describes an automated cognitive process dividing continuous experiences into meaningful event units based on perceptual and conceptual cues. These segmented events modulate higher-order cognitive processes such as attention and memory.
We present a preregistered experiment designed to differentiate the effects of map design as perceptual clues and semantic framing as conceptual clues on segmentation behavior in the context of dynamic maps. 125 participants performed a segmentation task on dynamic maps displaying insect population changes on fictional islands by pressing a key when they perceived the start or end of an event unit. Three independent variables were orthogonally varied in creating the stimuli: The slope of the population development, the framing of the species as either invasive or endangered, and the mapping of the values to either a hue- or saturation-based color scale.
We found that segmentation agreement between participants was higher if the depicted slope matched the expectation encouraged by the framing, but only if the color scale made the direction of change salient. These results replicate prior findings that event segmentation is influenced both top-down by expectations and bottom-up by the salience of visual features for the special case of dynamic maps. Understanding viewer segmentation aids in leveraging dynamic maps for effective communication.
Subsequent research will explore the impact of the spatial distribution of the depicted change on segmentation agreement.
Keywords: Event Segmentation, Data Visualization, Spatial Cognition, Maps
Presentation type: Poster Presentation
Session: Human Factors II

Developmental changes in non-symbolic number comparison: How visual cues influence decisions

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Numerosity processing in dot comparison tasks is influenced not only by the number of the dots but also by continuous magnitudes, such as the size of the dots and their convex hull (the largest contour around all dots). Our group has demonstrated that certain continuous magnitudes affect numerical comparisons in opposite ways. While we tend to judge dot arrays with a larger convex hull as more numerous, we tend to judge dot arrays with smaller rather than larger dots as more numerous. It has been shown that during development, children become increasingly precise in comparing such non-symbolic numerosities. According to the classical view, this improvement is the result of the sharpening of internal number representations. However, this view has recently been challenged by Piazza et al. (2018) who proposed that this developmental trend is driven by a so-called filtering process, i.e. children get increasingly better at filtering out irrelevant continuous magnitudes. In the current study we investigated whether convex hull and dot size are affected differently by developmental changes. To do so, we implemented a dot comparison task in which dot size and convex hull were separately manipulated and compared performance and congruency effects of 10-year-old children and adults. Our results suggest that, depending on the type of continuous magnitude, the increase in performance can be explained by both sharpening and filtering.

Keywords: non-symbolic number, sharpening, filtering, dot comparison, development
Presentation type: Poster Presentation
Session: Perception II

Neural markers of social brain activation in human-robot interaction

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TU Berlin

Due to the limited brain capacity to process information, anticipatory mechanisms unfold to predict others' behavior and adapt one's own responses. To do this, the social brain follows cues like movements, facial expressions, and gaze direction to predict others' mental states. With the rise of artificial intelligence and the imminent introduction of artificial agents into our society, robots will evolve from mere tools to become teammates or even companions. In order to understand how this might impact social interactions, we must understand how social brain networks respond to these technologies in real-life interactions. Although it is reasonable to assume that interacting with robots with human-like features (e.g., behavior, appearance) might elicit activation of these networks similar to human-human interactions, current research has not directly answered this query. In the current project, we aim to identify neural markers of the activation of social cognitive mechanisms with artificial agents using supervised machine learning (ML) models based on brain activity measured with functional near-infrared spectroscopy (fNIRS). Combining neuroscience methods with ML techniques has the potential to reveal whether interactions with robots distinctively evoke social-cognitive mechanisms (e.g., related to action-perception, mentalizing, face perception) or general cognitive mechanisms (e.g., attention, cognitive control). The goals of the project are to (i) gain an understanding of the social-cognitive mechanisms involved in human-robot interaction, (ii) characterize the brain circuitry engaged in human-robot interactions, and (iii) define the presence or absence of neural markers that reflect the recruitment of social cognitive mechanisms.

Keywords: social brain network, human-robot interaction, functional near-infrared spectroscopy (fNIRS), machine learning models
Presentation type: No-Data Poster
Session: Interaction and Social Psychology

High-order cognitive mechanisms modulate the deployment of gaze-guided attention in collaborative scenarios with artificial agents

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Understanding nonverbal cues is pivotal for social interaction, enabling the inference of other's mental states. Studies that investigated these nonverbal cues showed that reflexive gaze-guided attentional orienting can be modulated by contextual factors like action expectations (Perez-Osorio et al., 2015, 2017); however, the cognitive mechanisms underlying the processing of incongruent gaze shifts remain unclear. We propose that cognitive control modulates the impact of irrelevant gaze shifts during task execution. In this context, we measured the effects of task-related expectations on the processing of the agent's signals in performance (RTs, error rates, and eye movements) and EEG correlates (N2 component and theta activity) of cognitive conflict. We expected (1) top-down modulation of the attentional orienting according to task goals, (2) higher performance cost to incongruent social signals reflected in cognitive conflict correlates. Results showed that participants followed the agent's gaze, revealed by faster response times to targets congruent with head/gaze direction relative to incongruent locations (in all Experiments). Additionally, incongruent (relative to congruent) head/gaze shifts elicited higher error rates (Experiments 2-4), larger curvatures in eye-tracking trajectories (Experiment 3), larger N2 amplitudes and higher Event-Related Spectral Perturbation (ERSP) amplitudes (Experiment 4). Participants followed the agent's gaze/head shifts, but goal-oriented expectations modulated attentional orienting to task-relevant locations independent of gaze direction. This shows that cognitive control modulates the impact of irrelevant social signals, as reflected by performance and EEG cognitive conflict markers. Our findings suggest that humans process irrelevant signals from artificial agents, which impacts complex collaborative settings, either improving or hindering performance.

Keywords: gaze-guided attention, gaze cueing effect, cognitive control, electrophysiological markers, ERPs, Event-Related Spectral Perturbation (ERSP)
Presentation type: Oral presentation / Talk
Session: Facial Expressions II

Infants' motor skills, cognitive functions and need understanding in the development of early helping behavior

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Infants start to help early after their first birthday, and reliably help another person in need throughout their second year of life. Although recent research showed that several processes are involved in the development of this prosocial attainment, the early developmental trajectory that precedes the ontogeny of helping behavior is not well understood. Here, in a longitudinal study, we investigate how infants' motor and cognitive functions in the first year of life contribute to early prosocial understanding and helping behavior in the second year. Motor and cognitive abilities were assessed throughout the first year (3,6,9,12 months) and subsequent instrumental helping behavior, social interaction skills and motor development at 16 months. Additionally, we investigate the role of infants' prosocial understanding, which we assessed using an eye-tracking paradigm to test their understanding of others' needs, based on their anticipatory gaze behavior, and looking time towards expected and unexpected outcomes. Preliminary analyses, with a sample size of N=70 indicated that children's helping behavior at 16 months was predicted by both motor development during the first year ($r(67) = .247$, $p < .05$), and cognitive abilities at 6 months of age($r(66) = .25$, $p < .05$). Preliminary analyses of children's prosocial understanding at 16 months did not reach statistical significance, however, the data suggests a potential trend indicative of children's understanding of others' needs. Our findings suggest that during the first year of life, motor and cognitive abilities are components of a developmental system contributing to helping behavior during the second year of life.

Keywords: helping behavior, motor development, cognitive development, understanding others' needs
Presentation type: Oral presentation / Talk
Session: Motor Development and Cognition

A TVA-based model of the Attentional Blink

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The Attentional Blink (AB) refers to a deficit reporting a second target (T2) embedded in a stream of distractors when presented 200-500 ms after a preceding target (T1). At TeaP 2021, I presented empirical evidence showing that the processing speed of T2 is lower during the AB, supporting AB theories placing a bottleneck at the encoding stage. In this talk, I will present the first analytical model of the AB based on these findings. The model is an extension of the Theory of Visual Attention (TVA; Bundesen, 1990) and can be used to fit data from individual participants. The model is also capable of predicting key findings from the AB literature such as Lag-1 sparing, target swaps, and effects of T1 difficulty. This makes the model a promising tool in the endeavor to better understand the underlying dynamics of the AB phenomenon.
Keywords: Attentional Blink, Mathematical Modeling, Visual Attention
Presentation type: Oral presentation / Talk
Session: Progress in TVA-based Visual Attention Research: From Fundamentals to Applications I

How Short-term Experiences do and do not Influence the Retrieval of Item-specific Long-term Bindings

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Human behavior is guided by prior experience such as bindings between stimuli and responses. Experimentally, this is evident in performance changes when features of the stimulus-response episode reoccur either in the short-term or in the long-term. So far, effects of short-term and long-term bindings are assumed to be independent from one another. In a large-scale re-analysis of eight item-specific stimulus-response priming experiments that orthogonally varied task-specific classifications and actions in the short-term (trial N-1 to trial N) and, item-specifically, in the long-term (lag of several trials), we tested this independence assumption. In detail, we tested whether short-term experiences (repetitions of classification and action features in two consecutive trials) affected the retrieval of item-specific long-term stimulus-classification (S-C) and stimulus-action (S-A) bindings as well as potential long-term C-A bindings. The retrieval of item-specific long-term S-C bindings (i.e., the size of item-specific S-C priming effects) was affected by the persisting activation of classifications from trial N-1 (short-term priming). There were no further interactions between short-term experiences and long-term bindings. These results suggest a feature-specific, selective influence of short-term priming on long-term binding retrieval (e.g., based on shared feature representations). In contrast, however, we found evidence against an influence of short-term C-A bindings on long-term binding retrieval. This finding suggests that the processes contributing to short-term priming and long-term binding retrieval are dissociable from short-term binding and retrieval processes. Our results thus inform current theories on how short-term and long-term bindings are bound and retrieved (e.g., the BRAC framework).
Keywords: binding, retrieval, memory, action control
Presentation type: Oral presentation / Talk
Session: Feature binding in action control and beyond I: How binding contributes to stimulus-response learning, cognitive control, and event segmentation

The First rather than the Most Relevant Feature of a Future Action Consequence Guides Proactive Effect Monitoring – Evidence from Anticipatory Saccades

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When an action predictably yields a contingent effect, we associate action and effect, allowing us to proactively shift our eyes to the effect's anticipated future location. Such anticipatory saccades prepare for the later comparison of expected and actual effect (proactive effect monitoring). Importantly, anticipatory saccade latencies are adapted to the future effect's timing. When an effect predictably appears after a short(long) delay, we initiate the first anticipatory saccade towards it earlier(later). Here, we used this temporal adaptation of anticipatory saccades to the timing of future effects to assess how relevant as compared to irrelevant effect features are proactively monitored. Effects of left(right) responses predictably appeared after a short(long) delay. In one half of the experiment, only action-irrelevant effect features (coloured circles) were visible. In the other half of the experiment, a relevant effect feature (number to respond to) appeared within the irrelevant effect some time after its onset. Crucially, the short(long) delay until the onset of the relevant effect feature was manipulated inversely to the long(short) delay of the irrelevant effect feature. We observed that participants' first anticipatory saccades occurred earlier(later) based on the delay of the irrelevant effect feature which always occurred first. The timing of the subsequently-occurring relevant effect feature did not yield an influence on anticipatory saccade latencies. Thus, we conclude that the timing of proactive effect monitoring is determined by the temporally first effect features rather than the most relevant effect features.

Keywords: action control, monitoring, eye tracking, action-effect association, anticipatory saccade, effect relevance, timing
Presentation type: Oral presentation / Talk
Session: Action Control

Do people punish others for defecting or for failing to conform to the majority?

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Do people punish others for defecting or for failing to conform to the majority? In two experiments, we manipulated the base rates with which the participants' partners cooperated or defected in a Prisoner's Dilemma game. The effects of this base-rate manipulation on cooperation and punishment were assessed using a multinomial processing-tree model. High compared to low cooperation rates of the partners increased participants' cooperation. When participants' cooperation was not enforced through partner punishment, the participants' cooperation closely aligned with the partners' cooperation rates which points to a conformist motive behind cooperation. Moral punishment of defection increased when cooperation rates were high compared to when defection rates were high. Likewise, antisocial punishment also increased when cooperation rates were high compared to when defection rates were high. This directly contradicts the assumption that people punish conformity-violating behavior irrespective of whether the behavior supports or disrupts cooperation. Also, moral punishment of defection remained the most frequent type of punishment even when defection was the more common behavior. Punishment is thus sensitive to the rates of cooperation and defection but, overall, it is primarily used to discourage defection and not to enforce blind conformity with the majority.

Keywords: cooperation, moral punishment, antisocial punishment, multinomial modeling, conformity, descriptive norm
Presentation type: Oral presentation / Talk
Session: Social Psychology

Hallucinating voices through predictions and errors

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Auditory verbal hallucinations (AVH) are a cardinal symptom of psychosis but are also present in 6-13% of the general population. Alterations in sensory feedback processing are a likely cause of AVH, indicative of changes in the forward model. However, it is unknown whether such alterations are selective for voices and similar along the psychosis continuum. By directly comparing psychotic and nonclinical voice hearers (NCVH), in our first experiment we probed whether and how AVH proneness modulates sensory feedback processing for voices and tones (N1, P2) with event-related brain potentials (ERPs). In a second experiment, we manipulated the emotional quality of the self-voice and examined whether unexpected changes in one's voice feedback engage attentional resources distinctly as a function of hallucination proneness. In the first experiment, groups differed in sensory feedback processing of expected and actual feedback: NCVH displayed an atypically enhanced N1 to self-initiated voices, while N1 suppression was reduced in psychotic patients. In our second experiment, we observed that the increased N1 response to self-generated voices with higher hallucination proneness did not depend on voice quality. Moreover, hallucination proneness was associated with a reduced N2 response to unexpected voice quality in sensory feedback.
These findings suggest that selective changes in sensory feedback processing in self-voice production are a core feature of AVH. They additionally suggest a link between hallucination proneness and an altered response to unexpected change or error awareness. The results provide partial support for continuum models of psychosis.

Keywords: auditory verbal hallucinations; voice; sensory feedback; event-related potentials; forward model.
Presentation type: Oral presentation / Talk
Session: How do auditory and speech processing alterations contribute to symptoms in psychosis: a predictive coding approach

Visual Perceptual Learning of a Crowding Task: A Comparison of three age groups

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Visual crowding refers to the impairment of recognizing peripherally presented objects flanked by distractors. Crowding is characterized by a radial-tangential anisotropy, which describes an ellipsoid shape of the crowding area elongated along the radial target-fovea axis. Crowding effects, exhibiting a "critical distance" between target and flankers, can be reduced by perceptual learning. In this experiment we investigated the learning-induced reduction of crowding in normally-sighted participants of three age groups (<40 years, N=30; 40-60 years, N=21; >60 years, N=14), who were trained to detect the orientation of a Landolt-C optotype flanked by distractors in the upper left and right quadrant of the visual field at an eccentricity of 6.5° visual angle over four sessions. A staircase procedure (2-down, 1-up) adjusted the critical target-to-flanker distance needed to achieve 70.7% correct responses during training. The results show that all three age groups improved significantly over four sessions ($p < .001$), indicated by a decrease of this target-to-flanker distance, with no significant difference between the age groups ($p = .562$). Interestingly, the radial-tangential anisotropy was less pronounced in the two older age groups in comparison to the youngest group. Overall, the anisotropy tended to decrease with training ($p = .058$). The results show that perceptual learning of a crowding task with optotypes is also feasible for older age groups, and could as such be a promising tool in rehabilitation programs to help improve peripheral vision e.g. in patients with central vision loss.

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Keywords: visual perceptual learning, visual crowding, psychophysics
Presentation type: Poster Presentation
Session: Perception I

Attribution of selfhood based on simple behavioral cues: Towards a Pars Pro Toto model

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While the necessity of a concept of "self" for understanding human behavior remains subject to debate, the significance of this notion in everyday life is evident. Lay individuals ascribe selves not only to humans but also to animals and technical systems, shaping their interactions accordingly. While a layperson may not be able to provide a clear definition of a "self", the literature suggests that there are objective behavioral cues that elicit attributions of selfhood. These eliciting cues may be as minimal as simple movement perceived as causal to some event. The present work aimed to identify which types of behavioral cues may increase selfhood-attributions to other agents such as robots. Specifically, we compared behavior of non-humanoid robots suggesting either the presence or absence of behavioral cues for one of the characteristics of causality, equifinality, behavioral efficiency, learning sensitivity, and context sensitivity. Results showed a consistent pattern of increased selfhood-attribution towards robots exhibiting any one of the examined minimal characteristics. Furthermore, the majority of perceived sentient characteristics of the robot were triggered by any single characteristic's cue. These results reflect a pattern similar to the Halo effect: Even a single cue of selfhood related characteristics may be sufficient to trigger a change in overall selfhood-attribution to robots. We frame this in a Brunswikian model of selfhood-judgement, wherein selfhood is attributed based on the activation of self-related characteristics. We propose that not all representations of characteristics are directly triggered by their corresponding behavioral cues, rather that the characteristics interact with each other.

Keywords: self, selfhood-attribution, human-robot-interaction, Halo-effect
Presentation type: Oral presentation / Talk
Session: Self-Processing in the Social Mind: Insights from Behavioral and Neurocognitive Psychology

Joint attention: a naturally evolving process or a skill shaped by different factors?

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Joint attention (JA) evolves around 9 months of age in typical development and allows infants to actively participate in triadic situations and to monitor others' behaviour. However, this naturally evolving process can be influenced by various maternal and infant factors. In this study, we were interested in which explanatory mechanisms for the development of joint attention are the most significant.
The observational and questionnaire-based data collection of the third wave of Cohort '18 Growing Up in Hungary was conducted with one-year-old children and their mothers. With the participation of 247 infants (M_{week} = 54.5; SD_{week} = 1.16; 136 boys, 111 girls) we assessed children's temperament, sustained attention, socio-emotional competencies and joint attention skills, as well as the quality of mother-child relationship.
General Linear Model was applied to find the best fitting model among our variables ($F[5,200] = 5.56$, $p<0.001$, $R^2 = 0.10$). The results suggest that more intense sustained attention and lower levels of socio-emotional difficulties predicted better JA skills in one-year-old children (respectively, $\beta = 0.15$, $p = 0.027$; $\beta = -0.15$, $p = 0.032$), while positive affectivity/surgency had a negative effect on JA performance ($\beta = -0.17$, $p = 0.015$). It was also observed that children at higher risk of socio-emotional difficulties had weaker ability of JA when maternal attachment quality was low ($\beta = 0.18$, $p = 0.011$).
Our results underline that although JA skills are assumed to be naturally emerging, infants with higher activity or vulnerable socio-emotional competencies might possess weaker JA skills.
Keywords: Cohort '18 Growing Up in Hungary, joint attention skills at 12 months of age, socio-emotional development
Presentation type: Oral presentation / Talk
Session: Joint Action

Food stimuli and fasting state affect switching costs but not task choice in voluntary task switching between a food and digit task

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Recent studies showed that switching between affectively salient and neutral task sets leads to asymmetrical switch costs, which has been ascribed to affectively salient stimuli gaining accelerated access to attentional resources. Here, we investigated the influence of affectively salient food stimuli and fasting state of subjects on task performance and task choice in a voluntary task switching paradigm, in which the neutral task required categorisation of digit stimuli as odd or even. The affective food task required categorisation of food images as sweet or savoury. Fasting duration amounted to 14 and 18 hours in Experiment 1 and 2, respectively.

In Experiment 1, we observed asymmetric switch costs, with larger switch costs when switching away from the food task to the digit task as compared to switching to the food task. Longer fasting duration increased this asymmetry by increasing the costs when switching from food to digit task in Experiment 2.
Despite these effects on response time switch costs, task choice and switch rate were not affected by either stimulus content nor fasting.

These results suggest that the affective salience of the stimuli facilitates the activation of the corresponding food task-set in working memory causing difficulties in deactivating the task when switching to the neutral digit task. In addition, the larger state of hunger further increased subjects' difficulties to deactivate the food task set as shown by the larger fasting-related asymmetry of switch costs in Experiment 2 compared to Experiment 1. Importantly, hunger did not affect the subjects' task choice.

Keywords: switch costs, food stimuli, fasting, voluntary task switching
Presentation type: Oral presentation / Talk
Session: Multitasking and Cognitive Control I

Manipulating Trust in Artificial Intelligence: the Impact of AI Framing

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An increasing number of Artificial Intelligence applications are developed and used in today's society. Despite this, the public has relatively low knowledge on how AI functions or the extent to which it is deployed. To better understand the relevance of framing AI in terms of how it works vs. where it is deployed, a study ($N = 513$) was conducted. We compared the influence of brief AI descriptions (functionality framing vs. applications framing vs. control group) on a number of variables: trust in AI, attitudes, risk and opportunity perception, aversion, and AI usage intention. Demographics, knowledge about AI, and confidence in one's knowledge were assessed. Results showed a significant impact of framing on trust and aversion. Participants who read a description regarding the use of AI (applications) reported higher trust and lower aversion. Results further reveal an interaction effect of age and gender, with younger men placing significantly more trust in AI. Elevated trust in AI was further explained by people's high confidence but not their knowledge. Lower AI aversion was related to both higher levels of knowledge in AI and higher confidence. Risk and opportunity perception together with attitudes remained similar across the three groups. Additionally, both trust in AI and aversion significantly predict intention to use. Our findings thus highlight the impact AI framing can have on trust and aversion, which in turn relate to people's intention to use AI applications. These results further bring into question the stability of trust and aversion in relation to AI.

Keywords: artificial intelligence, trust, AI framing, aversion, use intention
Presentation type: Poster Presentation
Session: Human Factors I

Costs of Partially Reversing Stimulus-Response Mappings in the Stroop Task

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Consistent practice of a stimulus-response (S-R) mapping is assumed to establish corresponding S-R associations that facilitate processing when the mapping is retained and produce interference when the mapping is reversed. In addition, previous research using EEG recordings in a conflict task found alterations in brain activity associated with action monitoring and error adaptation following the reversal of S-R mappings.
To assess the costs of reversing S-R mappings in a conflict task independent of practice, we used a four-choice Stroop task in which the response assignment for two of the colors was reversed after the first half of the experiment. For the other two colors, however, the initial S-R mapping was retained. This partial reversal procedure allowed us to compare performance for reversed and retained stimuli in the second half of the experiment. We found persistent reversal costs throughout the experiment, which were specifically limited to trials in which the stimulus category was switched (i.e., from a retained stimulus to a reversed stimulus). Notably, Stroop interference and conflict adaptation, as indicated by the (confound-minimized) Congruency Sequence Effect (i.e., a reduction in the Stroop effect after incongruent compared to congruent predecessor trials), remained unaffected by the reversal.
Taken together, our results demonstrate substantial costs of partially reversing S-R mappings in a conflict task. These costs, however, were context-dependent (not present when the mapping was also reversed in the preceding trial) and did not affect conflict processing, underscoring the nuanced impact of established S-R associations on different aspects of cognitive processing.
Keywords: Stimulus-Response Mapping, Reversal Costs, Stroop Task, Proactive Interference, Task Switching
Presentation type: Poster Presentation
Session: Cognitive Control and Conflict II

Following your Heart: Cardiac Autonomic Modulation as a Feature of Decision-Making under Ambiguity and Risk in Women and Men

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Decision-making requires a bidirectional flow of information from perception, emotion and bodily behaviour. However, little is known about the influence of this bidirectional connection on decision-making. To shed light on this nexus, cardiac autonomic modulation, as assessed by heart rate variability (HRV), was investigated during decision-making. One hundred twelve healthy participants completed two established decision-making tasks under conditions of ambiguity (Iowa Gambling Task) and risk (Game of Dice Task). Heart rate was continuously recorded by high-resolution electrocardiography at rest, during, and after completion of the tasks. To account for differences in cardiac autonomic modulation the sample was stratified by sex. HRV indices in time, frequency, and non-linear domains were selected to assess vagal modulation and sympatho-vagal balance. Vagally meditated HRV showed a pattern corresponding to a replenishment effect by increasing during decision-making in both tasks compared to rest, and then gradually returning to initial levels during recovery. This effect may indicate self-regulation, such as enhanced concentration, mental focus or emotional regulation. Regarding decision-making performance, both women and men making disadvantageous decisions under ambiguity had higher vagally mediated HRV than those making advantageous decisions. Consistent with this finding are the results for decisions under risk for women. Contrary, men who made disadvantageous decisions showed lower vagally mediated HRV than those making advantageous decisions. The results suggest that there are core sex differences that should be investigated in the future. This study underpins that HRV is a potent tool for selecting somatic characteristics associated with performance in decision-making under ambiguity and risk.

Keywords: Autonomic nervous system, Heart rate variability (HRV), decision-making under uncertainty, Iowa Gambling Task (IGT), Game of Dice Task (GDT)
Presentation type: Poster Presentation
Session: Decision Making

Event segmentation in naturalistic settings - Influencing factors and neurophysiological underpinnings

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This talk gives an overview of our current research on event segmentation. Event segmentation describes how the continuous stream of information can be divided into meaningful segments. According to event segmentation theory, various subprocesses are involved, such as the formation of a working event model, the use of already established event schemata, and the permanent comparison between the current model and reality in order to be able to update the model if the prediction error is too high. Studying healthy adults with an event segmentation task and simultaneously recording neurophysiological data via EEG, we were able to show that these subprocesses are reflected in different frequency bands, which underpins the mechanistic chain of processes. Furthermore, we investigated the effects of different cognitive control states in healthy adults as well as the effects of manipulations of neurophysiological signal transmission, e.g. by pharmacological manipulation of the catecholaminergic system. In a further part of our research, we also investigated event segmentation in healthy adolescents and compared their segmentation with that of healthy adults. Here we found that adolescents divide the information stream into longer segments, but could be brought to an "adult" level via appropriate instructions. Importantly, we were also able to show that changes in event segmentation are a possible underlying mechanism in ADHD. Adolescent ADHD patients segmented the information stream into longer segments than healthy peers, and in particular showed altered processing of social cues. Thus, event segmentation could serve as a conceptual framework for mechanistic ADHD concepts.

Keywords:
Presentation type: Oral presentation / Talk
Session: Feature binding in action control and beyond II: How binding contributes to stimulus-response learning, cognitive control, and event segmentation

Exploring the Link Between Cognitive Control and Emotion Regulation: Insights from Laboratory Studies and a Meta-Analysis

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Introduction:
Emotion regulation is a fundamental aspect of human adaptive functioning, and its connection to cognitive processes has long been of interest. Yet, the precise nature of the relationship between emotion regulation and cognitive control remains elusive and there is a scarcity of systematic reviews and meta-analyses.

Method:
To address this gap, we explored the link between individual differences in cognitive control (response inhibition, memory updating, and set-shifting) and emotion regulation strategy use and ability (reappraisal, suppression, acceptance, and rumination) by conducting two laboratory studies (N1 = 199; N2 = 115) and a meta-analysis.

Preliminary Results:
Using a latent-variable model, our laboratory studies revealed small-sized associations between reappraisal ability with memory updating and response inhibition. Intriguingly, our meta-analysis supported and extended these findings, yielding evidence for small relationships between reappraisal ability with memory updating and response inhibition. In contrast, we observed a lack of robust associations between cognitive control and the use and success of other emotion regulation strategies across studies.

Discussion:
The combined results of our laboratory studies and the meta-analysis offer theoretical and methodological insights into the cognitive underpinnings of emotion regulation. In addition, our findings challenge previously held assumptions about the close relationship between cognitive control and emotion regulation. Instead, alternative conceptions of emotion regulation emphasizing the flexible adaptation of regulatory strategies to various contexts may be more pertinent for studying the link with cognitive control.

Keywords: Emotion regulation, cognitive control, executive functions, reappraisal, suppression, acceptance, rumination
Presentation type: Oral presentation / Talk
Session: Affect, motivation and control II

Influence of simple and elaborative feedback on practice tests

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Taking a practice test during the learning phase improves performance on a delayed final test - a phenomenon known as the testing effect. The testing effect is stronger when feedback is provided. However, while most studies provide the correct answer or simply use a restudy phase as feedback, it is unclear whether elaborative feedback has additional positive effects. Our experiment therefore investigated how different types of feedback affect learning through testing. Each condition involved reading a text and taking a multiple-choice practice test. The type of feedback was varied: The first group received no specific feedback, the second group correct-answer feedback, and the third group correct-answer feedback plus elaborative feedback. All groups had the opportunity to restudy the text afterwards. After a delay of one week, participants answered the same multiple-choice questions as in the practice test and took a short-answer test. Results indicated that both elaborative and correct-answer feedback led to better performance in the final multiple-choice test compared to restudying. However, feedback did not have a significant impact on the short-answer test. For those parts of the short-answer questions that had not been previously addressed by the practice questions, there was even a tendency for a negative effect of specific feedback. To test whether this was due to specifics of the materials, we are currently running a follow-up experiment in which we adapted the materials and constructed the short-answer questions such that we can systematically compare aspects that have and have not been addressed by the practice questions.

Keywords: testing effect, retrieval practice, feedback
Presentation type: Poster Presentation
Session: Memory and Learning II

Not all Stimuli are Conditioned Equal: The Amplifying Role of Processing Fluency in Evaluative Conditioning

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Evaluative Conditioning (EC), the change in the liking of a conditioned stimulus (CS) due to its pairing with a positive or negative unconditioned stimulus, is generally applied to several different kinds of stimuli, such as geometric shapes, Chinese characters, or nonwords. However, the inherent processing properties of these stimuli (i.e. how easy or difficult they are to process) are often overlooked - despite their potential impact on evaluative outcomes. Processing fluency is a factor known to affect evaluation. We compared two ways in which this could happen: According to a hedonic approach (e.g. Winkielman & Cacioppo, 2001), more fluent stimuli are evaluated more positively, whereas according to an amplification approach (e.g. Albrecht & Carbon, 2014), high fluency reinforces evaluative tendencies. We applied these different ideas of how fluency influences evaluative judgments to EC by investigating whether more fluent CSs lead to stronger EC effects (amplifying approach), or whether they enhance positive EC effects while attenuating negative effects (hedonic approach). Consistent with the amplification approach, our findings (N = 296) indicate that increased processing fluency of CSs intensifies EC effects. Contrary to the hedonic approach, we found no evidence that fluency universally leads to more positive evaluations of CSs.

Keywords: Evaluative Conditioning, Processing Fluency, Attitude Formation
Presentation type: Poster Presentation
Session: Memory and Learning I

In search of opportunistic consolidation: Disentangling diversion and similarity retroactive interference in episodic memory

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A short period of post-encoding waking rest can enhance subsequent memory performance relative to a distractor task. This effect has been interpreted as evidence in favor of an opportunistic consolidation hypothesis (Mednick et al., 2011). According to this theoretical account, diversion retroactive interference (RI) induced by a distractor task inhibits episodic memory consolidation, whereas minimizing diversion RI through waking rest provides ideal conditions for such consolidation processes to occur. However, memory-enhancing effects of waking rest might also be interpreted in terms of similarity RI. This form of RI is assumed to depend on similarities between original and interpolated materials, and to affect memory at the level of retrieval. Therefore, any observable effect of post-encoding waking rest might be the result of some latent combination of both diversion and similarity RI (Dewar et al., 2007). In two conceptual replications of an experiment reported by Martini et al. (2020), we used a multinomial processing tree (MPT) modeling approach to disentangle storage and retrieval contributions to memory performances following waking rest versus a distractor task. After studying an Icelandic vocabulary list, participants spent the 8-min retention interval either wakefully resting, using Instagram on their own smartphones, or studying a Norwegian vocabulary list. Finally, participants were asked to retrieve the Icelandic vocabulary in a cued recall and a recognition test. Our results suggest a role for both diversion and similarity RI in the waking rest effect. Thus, future research will profit from a more careful consideration of both influences on forgetting in episodic memory.

Keywords: episodic memory, retroactive interference, waking rest, multinomial processing tree modeling
Presentation type: Poster Presentation
Session: Memory and Learning I

Is the changing-state effect restricted to tasks that involve order processing?

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The finding that changing-state irrelevant sound is more disruptive to working memory than steady-state sound is known as the changing-state effect. Two of the dominant accounts differ in whether they expect the changing-state effect to be task-specific: The duplex-mechanism account posits that the changing-state effect is limited to tasks involving order processing, while the attentional capture account suggests it occurs regardless of the role of order information.
As previous evidence is inconclusive and primarily based on a single task each with and without order processing, we investigated the role of order information in multiple tasks and also considered whether participants applied order-based strategies.
In Experiment 1, tones served as irrelevant sound in two tasks with and two tasks without order processing requirements. Bayesian effect size modeling with a prior favoring the duplex-mechanism account was preregistered to assess potential null effects. Surprisingly, the changing-state effect was observed only in one order-based task and not in the commonly used serial probe task.
Therefore, Experiment 2 used words as irrelevant sound and focused on the serial probe and missing item tasks. In both tasks, a changing-state effect was found. While Experiment 1 leaned slightly towards the duplex-mechanism account, Experiment 2 aligned more with the attentional capture account. Additionally, participants' strategy choices did not consistently impact the changing-state effect.
Therefore, we are currently conducting a third experiment replicating the other two tasks from Experiment 1 with the irrelevant sound used in Experiment 2.

Keywords: irrelevant sound effect, null effect, changing-state effect, task-specificity, process-specificity
Presentation type: Poster Presentation
Session: Cognitive Control and Conflict I

Effects of Interruption Frequency on the Performance in a Procedural Task with Sequential Constraints

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We investigated the effects of interruption frequency on interrupted and uninterrupted performance in a multi-step procedural task with sequential constraints. One trial in the multi-step task consisted of five steps, which had to be learned and executed consecutively in predefined order. The task was occasionally interrupted by a letter classification task. After completion of that interruption task, participants needed to resume to the multi-step task at the correct step. Dependent variables were response times and rates of sequence errors (deviations from the prescribed order of steps), which were measured at the step after an interruption (resumption performance) and in the uninterrupted steps. Interruption frequency varied between subjects and was manipulated twofold, first, as the percentage of interrupted trials at all (25% vs. 75%) and second, by the number of interruptions per trial (i.e., once or three times) resulting in four different groups (low: 25% of trials, each interrupted once; mid: 25%, interrupted three times; mid: 75%, interrupted once; high: 75%, interrupted three times). The results revealed that participants resumed faster after interruption in the high-frequency group compared to both 25%-frequency groups, and more accurate compared to the low frequency group. At the same time, participants of the high-frequency group performed slower in uninterrupted trials compared to all other groups. These results show that high interruption frequency in multi-step tasks induces strategic shifts in participants' control mode and encourages a more flexible processing style causing better performance during interrupted trials for the cost of worse performance in uninterrupted trials.
Keywords: Interruption frequency, cognitive control, resumption, sequence error, flexibility
Presentation type: Oral presentation / Talk
Session: Multitasking and Cognitive Control II

Flipping the Script: Action-Plan Modification in a Precueing Paradigm

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We tested the idea that local changes in action demands (e.g., due to an invalid cue or trial-by-trial) result in frugal modifications of existing action plans via action-plan-modification operations. We implemented an experimental procedure making use of a cue that indicates the action requirements for an upcoming signal with a certain degree of reliability. Crucially, incongruent cue-stimulus pairs either require action-plan modification or "resetting" the prepared action plan and reselecting a new response from scratch. We systematically varied the proportion of valid cues over four experiments. There were four response conditions: left button press, right button press, dual button presses, no action. Results support the concept of action-plan modification rather than reset-reselect: switching between a left and a right response was faster and less error-prone than any other type of switch, both between trials and between cue and signal. Thus, it appears that given two responses that can be conceived of as polar opposites (within the same single-action category), there is an action-plan-modification operation ("invert") that transforms one into the other at a comparatively low cost.
Keywords: precueing, action planning, multiple action control
Presentation type: Oral presentation / Talk
Session: Action Control

How many independent constructs of mental performance are measured in the current test procedures of the German fitness to drive assessment?

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The German Driving License Ordinance (Fahrerlaubnis-Verordnung; FeV) specifies five dimensions of mental performance as integral parts of the overarching construct of fitness to drive: resilience, orientation, concentration, attention, and reactions. However, a clear definitional distinction between these five dimensions of mental performance does not appear to be possible without further ado. Based on previous research in this field, factory analyses were conducted in this study using data from the Vienna Test System (WTS) of 5757 traffic psychological examinations from Austria. Due to a lack of data on the orientation dimension, only the remaining four dimensions could be included in the analyses. The results of the factor analyses do not reflect the expected factorial structure even after taking into account various result variables of the test procedures. The relationship between the empirically determined factors and the legally defined dimensions will be discussed critically. Taking into account the present results, the question of what the test procedures used in this study actually measure should be investigated further in the future.

Keywords:
Presentation type: Poster Presentation
Session: Cognitive Control and Conflict I

Why we no longer trust in default measures of metacognitive efficiency and what can be done about it

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Meta-d'/d' has become the quasi-gold standard for measuring metacognitive efficiency in the field of metacognition research because meta-d'/d' is widely believed to provide control for discrimination performance, discrimination criteria, and confidence criteria. Here, we show that only under one specific generative models of confidence, namely the independent truncated Gaussian model, meta-d'/d' is guaranteed to control for all of those. Simulations using a variety of different generative models of confidence showed that for most generative models of confidence, there exists at least some combinations of parameters where meta-d'/d' is affected by discrimination performance, discrimination task criteria, and confidence criteria. These simulations imply that previously reported associations with meta-d'/d' do not necessarily reflect associations with metacognitive efficiency but can explained by correlations with discrimination performance, discrimination criterion, or confidence criteria. We argue that measuring metacognitive efficiency requires researchers to identify the generative model underlying confidence judgments for each specific task and set of stimuli. For this purpose, we present the R package statConfR, which allows researchers to fit the independent truncated Gaussian model as well as a number of alternative models of decision confidence and/or metacognition. If one of the alternative models of confidence describes empirical confidence judgments better than the independent truncated Gaussian model, we strongly recommend using the metacognition parameter of the corresponding model instead of meta-d'/d' to quantify metacognition.

Keywords: Cognitive modelling, metacognition, confidence, measurement, meta-d'/d', metacognitive efficiency
Presentation type: Oral presentation / Talk
Session: Metacognition and Problem Solving

The Key Role of Interaction with Algorithms in Augmented Judgment and Decision-Making

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Theory of Machine is a conceptual framework for describing and analyzing people's lay theories about the differences between human and algorithmic judgment and decision-making. Reminiscent of the Theory of Mind, it conceptualizes the idea of ascribing thought processes or mental states to algorithms. However, based on their own perceptions, from past experiences, and shaped by public media, people may conceive of humans and algorithms as functionally distinct ontological entities. Therefore, research on augmented judgment and decision-making should also focus on the differences between various algorithms in terms of (cognitive) abilities and behavior. A primarily algorithm-centric research agenda provides insights into a more fine-grained Theory of Machine that also distinguishes between different artificial intelligence (AI) systems. Accordingly, we provide empirical evidence from a study of $N = 472$ participants in a judge-advisor system showing that the interactive conversational interfaces of contemporary generative AI (i.e., ChatGPT) are effective in counteracting algorithm aversion, which often hinders the effective utilization of algorithmic advice. Indeed, both the opportunity to interactively engage with ChatGPT and the explanation it provides exert positive effects on algorithmic advice taking. However, making use of the opportunity to elicit an explanation does not further boost its positive effect on participants' advice weighting. Thus, self-explanatory AI and the opportunity to interact with it constitute independent countermeasures to algorithm aversion. This finding not only highlights the potential of generative AI to improve augmented judgment and decision-making, but also poses a threat to human autonomy.

Keywords: theory of mind, algorithm aversion, generative AI, conversational interface, repeated interaction, advice taking, ChatGPT
Presentation type: Oral presentation / Talk
Session: Artificial Intelligence

Identifying neural correlates underlying auditive and visual hysteresis with EEG

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Our perception can be influenced by our immediate perceptual past. If we persist in a former percept, that is, if perception of a current stimulus is pushed towards the former one, this is termed hysteresis. Hysteresis has been demonstrated in the perceptual and motor domain. The current study investigated neural correlates of perceptual hysteresis across two modalities – auditive and visual. In two experiments, ambiguous Necker cubes and Shepard tones were gradually shifted to evoke perceptual hysteresis while we recorded neural activity via EEG. Participants (n=31, mean age=25.1a, 13 females) indicated their percept of the stimuli by answering a yes-or-no-question on a keyboard. We varied the stimulus order by presenting them either in an ascending or a descending sequence. In both perceptual modalities we analysed the response data with a GLMM with a logistic link function. For the Necker cubes we found significant main effects for the stimulus, $z=11.426$, $p<.001$, $R^2_{\beta*}=.014$, and for order, $z=-2.279$, $p=.022$, $R^2_{\beta*}=.001$. Likewise, the GLMM for the Shepard tones showed significant main effects for pitch difference between first and second tone, $z=-38.602$, $p<.001$, $R^2_{\beta*}=.040$, and for order, $z=-30.707$, $p<.001$, $R^2_{\beta*}=.021$, indicating that perception in both domains was significantly influenced by the order of the stimulus sequence. Therefore, our behavioural results confirm previous findings and meet the prerequisites to continue with the analysis of the EEG data, which is currently under progress.

Keywords: brain, perceptual hysteresis, ambiguous stimuli, multistability, bistability, EEG, neural response
Presentation type: Poster Presentation
Session: Perception III

The Time Course of Action-, Object-, and Scene Perception - *Insights From a Free-Recall Paradigm*

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In our daily lives, we constantly perceive, recognize, and understand other people's actions. Both object- and scene-related information has been shown to contribute to these processes. However, the time course underlying the recognition of actions relative to the recognition of scenes and objects is not well understood. Revealing this information is crucial for developing cognitive models of action understanding. To address this question, we used a free-recall paradigm.
In the first stage, we presented human participants with grayscale images of everyday actions performed in naturalistic contexts at variable presentation times (33.3 – 500 ms), followed by a mask (500 ms). Participants (N = 30) were instructed to provide detailed descriptions of what they perceived in the image. In the second stage, a group of naïve raters (N = 10) evaluated whether these descriptions referred to the action, scene, objects, or to sensory information, and if so, whether these descriptions were correct. In order to reveal the temporal gradient in which these four components are recognized, thresholds for presentation times were calculated and compared, using probabilities for correct descriptions as the dependent variable.
We estimated lower recognition thresholds for actions than for scenes and objects, indicating that actions can be perceived faster than objects and scenes. Additionally, we found that objects were recognized faster than scenes. Considering prior work showing effects of scene information on action- and object recognition, our results suggest that scene, object, and action information might be processed in parallel.

Keywords: Action Recognition, Scenes, Objects, Psychophysics, Free-Recall
Presentation type: Oral presentation / Talk
Session: Cognitive and Neural Processes Underlying the Perception of Actions, Scenes and Objects II

Perception of means in bar charts: Within-the-bar bias without bar-tip limit error

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Bar charts are frequently used to depict mean values. Previous work revealed two interpretation problems. The within-the-bar bias (Newman & Scholl, 2012) refers to the assumption that a value below the mean (inside the bar) is more likely to be part of the underlying data distribution than a value above the mean (outside the bar). The bar-tip limit error (Kerns & Wilmer, 2021) refers to the assumption that the bar-tip is the upper limit of the data distribution, as if the bar chart showed a count. In the present work, it was investigated if the within-the-bar bias is only a product of the bar-tip-limit error or if it can occur independently. An online experiment was conducted with the between-subject factors data point (inside the bar vs outside the bar) and explanation (not given vs given). The explanation demonstrated that the data points can appear both inside and outside the bar, thus indicating that the bar-tip is not the limit. The results showed a replication of the within-the-bar bias, as participants rated the likelihood of the point inside the bar as higher than the point outside the bar. Importantly, the within-the-bar bias remained when all participants who conducted a bar-tip limit error were excluded. In line with this pattern, the explanation only led to a small reduction of the within-the-bar bias. Taken together, the data suggests that the within-the-bar bias can occur independently from the bar-tip limit error.

Keywords: graph comprehension, cognitive bias, bar charts, data visualization
Presentation type: Poster Presentation
Session: Methods

Irrelevance processing and creativity: Evidence from online eye-tracking

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Processing apparently irrelevant information has been identified as a driving force of successful, creative ideation. Here, in two online eye-tracking experiments, participants (N = 200 international adults) had to come up with possible uses for given objects. In Experiment 1, these target items were surrounded by allegedly irrelevant distractor objects. In line with prior research, we found a significant positive relation of the time looking at this peripheral information and the number and originality of the generated uses. But what are the underlying mechanisms of this relation? For one, this effect could be driven by additional inspiration from the peripheral information. For the other, this relation might be due to reduced interference with the standard use of the target item. To address this question, in Experiment 2, we manipulated within-subject whether distractor items were regular objects or random geometric figures and whether there were two or eight distractor items. Participants generated a higher number of and more original uses when distractor items were real objects compared to geometrical figures. However, for neither condition, we could replicate the positive relation of irrelevance processing and creativity, which we found in Experiment 1. This surprising outcome might be due to reduced statistical power compared to the first experiment. Furthermore, the introduction of the novel distractor condition might have led to a strategy shift. Possibly, irrespective of distractor type, participants relied less on the peripheral information which resulted in no relation of irrelevance processing and creativity for any condition.

Keywords: creativity, irrelevance processing, eye-tracking
Presentation type: Poster Presentation
Session: Metacognition

Organization of S-R episodes – Can temporal factors influence stimulus-response binding and retrieval?

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Stimuli and responses are assumed to be bound together into a common episodic representation, referred to as an event file or a stimulus-response (S-R) episode. Repeating any features of this episode triggers the retrieval of the whole event file, which impairs performance if the retrieved information does not match current processing requirements, resulting in partial repetition costs (PRCs). According to event segmentation theory, events are organized by different factors, such as causal connection, temporal information, spatial location, and subjective goal (Zacks, 2020). In a series of experiments, we used temporal organisation factors implemented by temporal adverbials or physical intervals to investigate this segmentation role in the formation of S-R episodes and the likelihood of retrieval. We assumed that the after-effects of stimulus-response binding are smaller – visible in smaller PRCs – after temporal factors that indicate longer periods compared to temporal factors that indicate shorter periods. To test this, we employed a narrative version of the S1R1-S2R2 task and systematically varied either the interval between S1 and R1 trigger (Go Signal for response) or the interval between R1 and S2. For temporal adverbials ("after a while" vs. "immediately after"), we found no evidence of a segmentation role as indicated in PRCs. However, physical cues implemented with response stimulus intervals (RSIs) manipulated across three levels (500 ms, 1,500 ms, 5,000 ms) between R1 and S2 supported segmentation and reduced the after-effects of stimulus-response binding after long as compared with short RSIs.

Keywords: Stimulus-Response Binding and Retrieval, Event Segmentation, Partial Repetition Costs, Temporal Adverbial, Stimulus Onset Asynchrony, Response Stimulus Interval
Presentation type: Oral presentation / Talk
Session: Feature binding in action control and beyond II: How binding contributes to stimulus-response learning, cognitive control, and event segmentation

Neural correlates of valence and arousal ratings responding to socio-emotional stimuli

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Emotional responses are organized along two dimensions: (1) valence, varying from negative to positive, and (2) arousal, varying from low to high. Behavioral responses along these dimensions are assumed to be mediated by different brain circuits. In this study, we used functional magnetic resonance imaging to characterize neural activity correlating with ratings of subjective emotional experience elicited by negative socio-emotional stimuli.

Hemodynamic changes were recorded in 40 healthy volunteers using functional magnetic resonance imaging (fMRI) while they viewed a set of socio-emotional pictures. In addition, we took ratings of valence and arousal of emotions arised in response to emotional stimuli after scanning. A block-design paradigm has been used consisting of pairs of negative and neutral periods generated by adding labels to ambiguous socio-emotional pictures.

In ROI analysis, a positive correlation was found between arousal ratings of emotions in response to negative emotion-eliciting stimuli and activation in the insula as well as inferior frontal areas. Our results confirm previous literature pointing out the role of insula in arousal generation through stimulus-driven evaluative processes and possibly the integration of cognitive, emotional and somatic components of emotion. Moreover, inferior frontal areas may modulate arousal to socioemotional cues as a result of considering subjective goals and experiences amongst situational demands.
Keywords: affective ratings, valence, arousal, fMRI, ROI analysis, negative emotion-inducing stimuli, emotional response
Presentation type: Poster Presentation
Session: Interaction and Social Psychology

Extracting attentional control from working-memory tasks: Not a solution

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UniDistance Suisse

Attentional control – also called executive functions or cognitive control – refers to our ability to maintain a goal and goal-relevant information in the face distraction. Recent research has put forward the difficulty of establishing attentional control at the latent-variable level. This questions the measures used so far, thus asking for other ways of measuring attentional control. Early research has modeled attentional control from working-memory tasks and short-term memory tasks (i.e., tasks used to measure either the temporary maintenance and manipulation of information or the temporary maintenance of information only). First, attentional control was modeled as the residual variance of working memory after controlling for short-term memory. Second, it was modeled as the common variance across working-memory and short-term memory measures, with higher loadings of the working-memory measures to the factor of attentional control. The purpose of the present study was to test the replicability and robustness of both models. After a systematic search, we found three datasets with relevant correlation matrices. We estimated the models using the original correlation matrices and 5000 correlation matrices bootstrapped from the original correlation matrices. Across the datasets, the models were not fully and exactly replicated. They required modifications to provide an acceptable fit to the data. Moreover, all these model estimations were not robustly observed when the 5000 simulated correlation matrices were used. Therefore, using working-memory and short-term memory tasks does not solve the difficulty of establishing attentional control as a latent variable. These findings challenge the conceptualization of attentional control.

Keywords: cognitive control, attentional control, executive functions, inhibition, working memory, short-term memory, structural equation modeling
Presentation type: Oral presentation / Talk
Session: Working Memory

Autonomic correlates of listening effort: Cardiac and pupillary responses to changes in listening demand

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The psychophysiological literature on mental effort is dominated by cardiovascular and pupil-related measures. However, research has not yet systematically compared effort-related cardiovascular and pupillary correlates of effort albeit both types of measures being driven by the same autonomic mechanisms. The presented study closed this gap by examining sympathetic and parasympathetic responses at the level of two organs—the heart and the pupil—to changes in the difficulty of a speech-in-noise task. Ninety-six participants performed twenty-six trials of the task under four different signal-to-noise ratios—ranging from -12dB to -6dB. In each trial, three digits embedded in white noise were presented, and participants had to repeat the presented digits. Participants performed the task twice under two different room light conditions—in the dark and with normal room light—to disentangle the sympathetic and parasympathetic contributions to changes in pupil diameter. Pre-ejection period, respiratory sinus arrhythmia, and pupil diameter were assessed during the tasks and preceding baseline (rest) periods to quantify sympathetic and parasympathetic responses to changes in listening demand. The results revealed that sympathetic impact on both the heart and the pupil dominated the respective parasympathetic effects suggesting that similar autonomic mechanisms underlie the responses of cardiac and pupillary correlates of mental effort.
Keywords: effort, listening, cardiac reactivity, pupil reactivity
Presentation type: Oral presentation / Talk
Session: The intensity of mental effort: Hot news from the body

Time perception in virtual reality and on the moon

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An important premise for the interpretation of the results in time perception studies employing virtual reality (VR) techniques is that the method itself does not affect time perception. I will present a study in which we tested this assumption by comparing timing performance in a real-life and a VR scenario. Our participants performed two timing tasks, requiring the production of an interval defined either by numerical values or by the duration of a physical process. The results show that the experience of immersive VR exclusively alters judgments about the duration of physical processes, whereas judgments about the duration of abstract time units are unaffected. These results demonstrate that effects of VR on timing performance are not driven by changes in time perception itself, but rather by altered expectations regarding the duration of physical processes. I will discuss the implications of this finding for the interpretation of VR studies in time perception research.
Keywords: Time perception, Virtual reality, Temporal expectations
Presentation type: Oral presentation / Talk
Session: Virtual Reality and the Perception of Time

Does language switching impact memory encoding?

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Previous research has shown that task switching can hurt how well information is encoded: Information presented on a switch trial is less well remembered than information presented on a repetition trial. This pattern suggests that higher control needs during switching lead to less attention toward the new task and thus worse encoding of information. While language switching shares many cognitive processes with task switching, it also differs in key components (e.g., need for selective attention). Thus, to better understand how switching can impact memory, we investigated whether language switching can also hurt how well information is encoded. In two experiments (N1 = 58; N2 = 55), unbalanced adult German-English bilinguals first completed a language switching task where pictures had to be named (Experiment 1) or categorized (Experiment 2) either in their L1 (German) or L2 (English) in a predictable sequence (e.g., L1, L1, L2, L2, L1, L1, etc.). After a filler task, they were asked to indicate whether a picture had been presented before and, if so, in what language. In Experiment 1, pictures that had been presented in participants' L2 were more likely to be remembered correctly than pictures presented in participants' L1. Importantly, however, we found no evidence that language switching hurt memory encoding, despite robust switch costs during picture naming. In Experiment 2, we again found no evidence that language switching hurt recognition memory. Together, these results suggest that a mechanism related to cognitive processes that are not shared between language and task switching hurts memory encoding.
Keywords: Bilingualism, language switching, memory encoding, task switching
Presentation type: Oral presentation / Talk
Session: The Impact of Language Experience on Learning and Memory

Practical exercises on sensation and perception: What it's all about

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Learning about sensation and perception is an important part of any introductory psychology course and there is probably hardly a course on the topic that does not include practical elements in one form or another. This is part two of a two-part poster, in which we present an article that was recently accepted for publication in the special issue of Visual Cognition about teaching sensation and perception. In the article, we describe eleven practical exercises complementing the lecture on sensation and perception. This is the theoretical part, where we provide an overview of the exercises with theoretical background, materials, procedure, learning objectives, and our experiences from ten semesters on what worked well and what not so much. We also present strategies for online delivery or suggest alternative exercises that can be implemented both in remote and in-person settings. Instructions for all exercises are available in German, English, and Spanish as open educational resources that can be reused, shared and modified. If you want to try out some of the activities for yourself, make sure to check out part one as well. We are looking forward to seeing you!
Keywords: teaching, open educational resources, sensation, perception
Presentation type: Poster Presentation
Session: Perception I

Masked priming online – A stringent test of feasibility, in-built problems and some recommendations

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Due to advances in technology and the availability of participant databases, online experiments have become very popular in recent years. However, in an online environment it is not possible to control hardware and software settings to the same extent as in a laboratory. However, control or accurate knowledge of these parameters is important for accurate timing. As a result, early research was sceptical about whether time-critical experiments, and in particular masked priming effects, could be achieved online. Several published studies now report the general feasibility of masked priming online, but none of these studies included a stringent measure of awareness. In addition, the precision of stimulus presentation is usually not reported, so it is not clear whether accurate stimulus presentation was achieved or not.
I will present a pre-registered masked number priming experiment addressing these points. Results showed that masked priming effects can indeed be obtained online, even under conditions of zero awareness. Descriptive analyses of the technical parameters showed that there was considerable variation in precision, but that the results hold still significant when only precise timing trials were considered. Given these results, researchers should not simply trust an effect obtained online, but should implement reports and criteria regarding important technical parameters and presentation precision.
Keywords: masked, priming, online testing, non-conscious
Presentation type: Poster Presentation
Session: Methods

Influence of audio renderings on spatial attention and social presence in virtual environments

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Using advanced audio rendering methods, spatial auditory impressions can be simulated that are indistinguishable from real sound sources in the room. Such a high degree of realism can be assumed as highly relevant for virtual social interactions. The aim of this study is to investigate whether these plausible auralizations allow sound source localization comparable to real sound sources as further indicator for realism and whether they improve social presence in virtual reality (VR). To address these questions, we implemented two different paradigms (placement task, eye-tracking task) to measure sound source localization and spatial attention in VR. In a within-subjects design (N = 49), three different advanced audio renderings were compared to loudspeakers and to an anchor (gaming audio engine) in terms of distance estimation and angular error (horizontal plane) as well as evaluations of audio quality and social presence. While loudspeakers resulted in less front-back confusions compared to all other conditions, we found that distance estimates were significantly more accurate for audio renderings compared to loudspeakers and that there was no difference in azimuth estimation once front-back confusions were controlled for. Overall, loudspeaker and audio rendering conditions were always more accurate than the anchor and resulted in higher ratings of social presence. Furthermore, social presence and audio quality were strongly correlated. Our findings demonstrate that advanced audio rendering methods result in close-to-real hearing in virtual environments and can also improve social presence, thereby leading to more naturalistic social scenarios.

Keywords: sound source localization, virtual reality, social presence, auditory perception, eye-tracking, realism, spatial attention
Presentation type: Poster Presentation
Session: Human Factors I

More is not always better: Temporal neural signatures of object-driven versus scene-driven human scene categorization

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Visual scene categorization is an impressively rapid process. Whether a scene's gist is mainly conveyed by object-centered or scene-centered information, however, has sparked a considerable debate. In this experiment, we used electroencephalography (EEG) to better understand the temporal dynamics of visual scene processing. Drawing on previous work from our research group, we expected that if diagnostic object information is available to the human observer at fixation, scene categorization commences in a local-to-global manner. Stimuli consisted of black-and-white images from four basic-level scene categories ("bedroom", "kitchen", "city", "train station") and three stimulus conditions ("objects", "scenes", "textures"), comprising fifteen exemplars each. With preliminary data from 21 participants, multivariate pattern analysis (MVPA) demonstrated above-chance accuracy in scene category decoding across stimulus conditions. Comparison of the proportional decoding peak latencies of the scene category-specific neural representations of objects, scenes, and textures across time showed significantly diverging peaks. Objects peaked first at ~150 ms after stimulus onset, followed by scenes at ~250 ms, and textures at ~350 ms, indicating that objects convey scene category information more rapidly than scenes while processing of scene diagnostic properties contained in textures emerges at an even later stage. Our findings stress the pivotal utility of local information for human scene categorization. While scenes compared to objects typically entail higher information density, pertinent diagnostic information may not always be incidentally available at fixation but requires additional sampling to be extracted. We therefore conclude that accessibility of scene category information can be expedited by local close-to-fixation object diagnosticity.

Keywords: visual perception, scene categorization, EEG, object information, global scene information, decoding, scene grammar
Presentation type: Poster Presentation
Session: Perception II

Effects of episodic response-response retrieval in implicit sequence learning

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In a pre-registered experiment (n=40), we investigated the influence of episodic retrieval of response-response bindings on implicit sequence learning. In a serial reaction time task (SRTT), each of three spatial stimulus positions was followed either by a high (80%) or a low (20%) probability stimulus position. Immediate repetitions of stimulus positions were not possible. Replicating standard sequence learning effects, responses in the highly probable sequences were faster and less error-prone than in the low probability sequences. Effects of sequence learning in the SRTT, however, are confounded with recent occurrences of sequences: In a high (low) probability sequence, the most recent previous occurrence of the initial stimulus of this sequence is followed by the same (a different) stimulus as the current test stimulus in 80% of the trials. Supporting the role of episodic retrieval in sequence learning, we found strong evidence for a retrieval of response-response sequences in accordance with the law of recency (Giesen et al., 2020). The effect of sequence learning was reduced but not eliminated after controlling for an episodic retrieval of response-response sequences. Residual effects of sequence learning – after controlling for episodic retrieval – were stronger for sequences that were correctly identified at the end of the experiment, but were still present also for trials without contingency awareness.

Keywords: episodic binding and retrieval, implicit sequence learning, serial response time task, response-response binding
Presentation type: Oral presentation / Talk
Session: Episodic retrieval of recent stimulus-response episodes as a source of cognitive control and learning

Intuitive sensorimotor decisions under risk take Newtonian physics into account

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Humans skillfully interact with objects in everyday tasks. They achieve this even though their sensory systems are inherently uncertain, and their motor systems are variable in the execution of movements. Therefore, every movement becomes a decision under risk, as actions lead to uncertain consequences. Such decisions have been studied classically with tasks involving lotteries involving uncertain gambles and explicit monetary rewards. More recently, sensorimotor decisions, specifically single movements to targets yielding rewards and losses, also have been conceptualized as decisions under risk. While human choices between gambles have long been known not to maximize expected gains, sensorimotor decisions have been well described by statistical decision theory in many tasks. However, as object interactions are inescapably governed by the laws of physics, the question arises, how people act under such circumstances.
Here, participants slid pucks to target areas, providing gains and losses within an immersive, naturalistic virtual environment. In this task, variability inherent in motor control interacts with the physical relationships governing objects' motion, specifically the kinematics of sliding pucks under the influence of friction. We devise a series of generative models of the human sliding behavior incorporating different assumptions about how perceptual uncertainty, motor variability, and subjective gains and losses could be combined. Using model comparison, we find evidence that human sensorimotor decisions in scenarios with prospective economic outcomes take Newtonian physics into account. This result has consequences for how sensorimotor actions under uncertainty in naturalistic tasks can be conceptualized and how the mind's internal representations of uncertainty are integrated.
Keywords: intuitive physics, sensorimotor control, uncertainty, risky choices
Presentation type: Oral presentation / Talk
Session: Seeing, Thinking, and Acting in a Physical World

Sequence learning as a means to reduce the Eriksen flanker effect?

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In three experiments with the Eriksen flanker task (Eriksen & Eriksen, 1974), we investigated whether a regular sequence of either the targets, the congruency levels, or both could be implicitly (or explicitly) learned and help reducing the flanker congruency effect in the sequence blocks compared to a respective random test block. In Experiment 1, both sequence types were present during six sequence blocks. Subsequently, in two different random blocks, either the target sequence or the congruency level sequence was randomized independently. As a result, the flanker effect in both random blocks was only minimally larger than in the adjacent sequence blocks, indicating that sequence learning either had not happened or could not be used in order to reduce the flanker effect. In Experiment 2, we manipulated the sequence types between participants. As a result, the flanker effect increased slightly in the random blocks in both conditions. However, since Experiments 1 and 2 did not reveal substantial (or even significant) learning effects, we made the sequences explicit in Experiment 3. In this case, the flanker effect in the random block of the target sequence condition was much larger (and overall RT much longer) than in the adjacent sequence blocks, but the learning effect was, again, small in the congruency level sequence condition. The former result replicates an observation by Koch (2007), while the latter result suggests that even explicit knowledge of a regular sequence of congruency levels cannot readily be used for flexible conflict adaptation.
Keywords: Eriksen Flanker Task, Conflict Adaptation, Sequence Learning
Presentation type: Poster Presentation
Session: Cognitive Control and Conflict II

False contingency knowledge reverses the color-word contingency learning effect

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In learning research, there is an ongoing debate about the role of awareness in human contingency learning. While a large part of the contingency learning (CL) effect is explained by episodic retrieval of previous responses (Giesen et al., 2020; Schmidt et al., 2020), a significant residual CL effect remains, which reflects a genuine impact of global contingencies on behavior (Rudolph & Rothermund, 2023; Xu & Mordkoff, 2020). In a pre-registered study, we tested the influence of contingency awareness on genuine CL by giving true or false instructions about the existing color-word contingencies. We found that genuine CL is modulated by awareness, as true (false) instructions amplified (reduced) the residual CL effect (see also Schmidt & De Houwer, 2012). Further, participants who were convinced of the falsely instructed contingencies until the end of the experiment actually showed a reversed residual CL effect, characterized by faster responses in low contingency trials that corresponded to the falsely instructed color-word combination. In sum, our findings suggest that genuine human CL, which is free from the influence of episodic retrieval, reflects propositional beliefs rather than association formation.
Keywords: Contingency learning, contingency awareness, episodic retrieval, propositional learning
Presentation type: Oral presentation / Talk
Session: Episodic retrieval of recent stimulus-response episodes as a source of cognitive control and learning

Cognition in Interaction: How to integrate Bottom- and Top-down processes regarding sense of control

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In situated actions the sense of control is an important concept not just to adjust actions to outside disturbances but also to adjust own movements regarding the environment to continue goal directed behavior. The sense of control can be related to the external sense of agency (according to Grünbaum, et al. , 2023) which refers to the feeling of controlling events outside of the body, such as objects, other people, and the environment. It involves the attribution of causality and intentionality over external events, which allows us to make sense of our surroundings and interact with them in a meaningful way.
For understanding the processes and affects this sense of control has on interactive behavior we developed a cognitive architecture that includes top-down cognitive and bottom-up sensorimotor processes and is able to interact with an environment. This approach is tested in a simulation-game where unpredictable disturbances take place the agent (natural or artificial) needs to cope with. The results of the artificial and human agents are compared and discussed. The question is how different levels of sense of control arise during the game and what cognitive processes are influenced in coping with the environment and task. Furthermore, it will be discussed how this mechanism can be used for a better human AI collaboration.
Keywords: Agency, Sense of Control, Cognitive Modelling, Situated Cognition, Top down processes, Bottom up processes
Presentation type: Oral presentation / Talk
Session: Sense of agency in action: The influence of control experience on goal-directed behaviour

How Perceptual Ability Shapes Memory

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The enhanced processing account suggests a closer connection between visual perceptual ability and memory than previously thought. This suggestion gains support from studies on special populations with experimental conditions based on neural changes in the ventral visual pathway, like grapheme-color synesthetes and color experts. Different studies reveal a unique profile of enhanced memory and perception in these groups, particularly when stimuli bias processing toward the ventral visual pathway in grapheme-color synesthesia, as opposed to the dorsal visual pathway. Past research indicates similar performance between grapheme-color synesthetes and color experts, compared to non-synesthetic controls, in tasks related to color perception, spatial contrast sensitivity, and memory for color information (Ovalle-Fresa et al., 2021). However, complementary predictions of the enhanced processing account regarding special populations with conditions based on neural changes in the dorsal visual pathway remain to be investigated. Thus, this study aims to comprehensively assess the enhanced processing account using three tasks, visual perceptual, short-term memory, and long-term memory. It will involve participants possessing characteristics of grapheme-color synesthesia, color expertise, sequence-space synesthesia, and/or spatial expertise to distinguish the impact of these four experimental conditions on perception and memory. The experiment will use two stimulus types, one biasing processing toward the ventral visual pathway (color stimuli) and the other biasing processing toward the dorsal visual pathway (location stimuli). This approach enables the examination of double dissociations between synesthetic experiences, elucidating the distinct contributions of the ventral and dorsal pathways. The results are discussed with regards to representational models of perception and memory.

Keywords: Synesthesia, Expertise, Visual perception, Memory, Enhanced processing account
Presentation type: Oral presentation / Talk
Session: Crossmodal Perception / Synesthesia

Emotional Contagion and Facial Mimicry in Dyadic Online Video Conferences - An Experimental Study Using Cross-Recurrence Quantification Analysis

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Due to the COVID-19 pandemic, many aspects of people‘s lives have been moved to digitally supported environments. While these rapid changes have proven to be more or less useful alternatives on a technical level, their impact on individuals‘ emotions and interpersonal processes remains largely unclear. As one essential and prevalent emotional process in social interactions, Emotional Contagion (EC) comprises the mostly automatic and unconscious transmission of emotions between two or more individuals. In previous research, EC has been studied in various interactive face-to-face contexts, e.g. teachers/students or leaders/employees. In the present study, we aimed to add to these findings by examining EC in dyadic online video conferences. We applied a lab-based experimental approach involving two participants interacting with each other via synchronized computers. In a structured interaction paradigm, the participants (N=104 in n=52 dyads) were talking to each other about recent emotional experiences while being filmed by webcams. The participants retrospectively reported on their subjective emotional experiences during the interaction, and their facial expressions were analyzed using the facial expression analysis engine FACET. The results of our repeated measures analyses indicate that EC takes place in videoconferences as well. For facially expressed joy, anger, and sadness, we additionally employed cross-recurrence quantification analysis and found evidence for above chance co-occurrence of the respective facial expressions in both interaction partners. These findings point towards the existence of facial mimicry - a process that has been proposed as an underlying mechanism of EC - in dyadic social interaction via online video conference systems.

Keywords: emotional contagion, facial mimicry, cross-recurrence quantification, facial expression analysis
Presentation type: Poster Presentation
Session: Interaction and Social Psychology

Effects of Mind Wandering Thought Probes on Reinforcement Learning Model Parameters

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Goal-directed and habitual behaviors have been linked to model-based (MB) and model-free (MF) reinforcement learning (RL) (Daw et al., 2005). During mind wandering (MW), attention is directed away from the external environment, which disrupts external stimulus processing (Schooler et al., 2011). According to the levels-of-inattention hypothesis, states of "weak" MW impact high-level cognitive processes while sparing lower levels (Schad et al., 2012). Recent findings show that spontaneous MW impairs MB learning while sparing MF learning, suggesting weak MW (Liu et al., 2023).

The existing literature has solely utilized static measures of trait MW and assumes momentary MW impairs RL. Given the dynamic nature of MW and RL, it is crucial to investigate the validity of this assumption, whether momentary MW influences RL model parameters during the learning process.

We modified a two-step decision task, designed to assess MF versus MB learning (Daw et al., 2011), to include thought probes about subjects' (N = 40) ongoing MW on a continuous scale. We assess the Spontaneous and Deliberate Mind Wandering Scale (Carriere et. al., 2013) to compare static versus dynamic relationships of MW with RL.

We adopt a computational dual-control model (Daw et al., 2011), implementing MF control via the SARSA temporal difference algorithm, and MB control via Bellman's equation, where the expected value of an outcome is weighted by its transition probability. Parameters and hyperparameters for RL models will be estimated using expectation maximization. Autocorrelation and crosscorrelation will be tested to inspect dynamics within and between MW and RL parameters.

Keywords: Reinforcement Learning, Model-Based Learning, Model-Free Learning, Mind Wandering
Presentation type: No-Data Poster
Session: Memory and Learning III

Drift Diffusion Model Decodes How Affective Task Content Modulates Switch Costs in Task Switching

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The impact of affective task content on task switching is an open issue. According to the affect dominance hypothesis, enhanced processing of affective task content, can lead to stronger activation of the affective task set and should result in increased switch costs for an affective compared to a neutral task. The occurrence of such asymmetric switch costs indicates that the affective task is processed as a more dominant task, which should be inhibited in order to allow for switching to the less dominant neutral task.
Here, we applied a drift-diffusion model (DDM) to investigate asymmetrical switch costs during an affective task switching. Participants performed cued task switching, categorizing either gender (neutral) or facial emotions (affective) while repeating or switching tasks. In line with the affective dominance hypothesis, the empirical results indicated higher switch costs for the affective compared to the neutral task.
The drift rate parameter of DDM effectively captured response times and choices across all conditions and allowed to differentiate switching performance as a key parameter. The affective-switch condition exhibited lowest drift rate, reflecting larger time to switch to the affective task. Conversely, the neutral repetition condition showed highest drift rate, reflecting the faster switching time.
In our view, the reduced drift rate in the affective-switch condition suggests a potentially increased reliance on inhibitory processes to overcome the influence of the previous neutral task, especially when dealing with emotional stimuli. This aligns with the observed switch cost asymmetry and highlights the interplay between emotional processing and task-switching mechanisms.

Keywords: Cognitive Control, Task Switching, Asymmetrical Switch Costs, Drift-Diffusion Modeling, Emotional Processing
Presentation type: Poster Presentation
Session:

The Influence of Medical and AI Knowledge on Risk and Benefit Perceptions of AI Applications

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Artificial intelligence (AI) is increasingly used in medicine, making it one of the largest and fastest-growing fields in which AI is applied. Previous research has shown that experts in the domain in which AI is used reported lower levels of trust in the AI's suggestions. There is, to our knowledge, no research investigating whether the risk-benefit perceptions of experts in the domain in which AI is applied differs compared to the perceptions of laypeople. Research on knowledge about AI itself, showed that higher knowledge about Artificial Intelligence was related to lower risk perception, even though risks and benefits were balanced. We assessed for N = 750 participants (N= 544 laypeople, N = 66 medical experts, N = 11 AI experts, N= 129 (former) AI students) whether medical expertise, AI expertise, AI knowledge as well as self-reported medical expertise and AI knowledge (subjective) influence risk and benefit perceptions of medical AI applications. Result showed that, higher AI knowledge was associated with lower risk and higher benefit perception. That was also true in case of self-reported levels of AI knowledge. However, when comparing AI experts' risk and benefit perception with (former) AI students and laypeople, benefits were perceived as significantly lower. Furthermore, medical expertise and self-reported expertise were related to higher risk perception. These results reveal the intricate ways in which actual expertise and self-reported expertise shape the perception of medical AI, emphasizing the need for clear and tailored communication to bridge the gap between perceptions and the reality of these technologies.

Keywords:
Presentation type: Oral presentation / Talk
Session: Artificial Intelligence

Remembering the UK Brexit referendum: The effects of emotional valence on long-term memory of a public event.

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Emotional public events, relative to non-emotional ones, are typically remembered more accurately, more vividly, and with higher confidence. However, most of the previous studies on this issue focused on negative public events. Thus, less is known about long-term memories for positive public events. To address this issue, we assessed individuals' memory for the time when they learned the results of the United Kingdom's 2016 Referendum on its European Union (EU) membership. Participants included British participants who voted to leave the EU in the referendum and found the event highly positive, British participants who voted to remain in the EU and found the event highly negative, and U.S. participants who did not vote and found the event neutral. Data from a total of 851 participants were assessed across four time points over the course of 16 months. The results showed that differences in memory between the Remain voters and the Leave voters emerged over time. Relative to the Leave voters, the Remain voters maintained higher levels of memory consistency with time; these results suggest that they maintained a more accurate long-term memory for the event. In contrast, the Leave voters maintained higher levels of memory confidence over time than the Remain voters, suggesting that they have over-confidence in their memory. Our results suggest that memories for the same public event can be remembered differently depending on whether individuals find the event positive or negative.

Keywords: emotion, memory, valence, autobiographical memory
Presentation type: Oral presentation / Talk
Session: Collective remembering: Social processes and the representation of public events in human memory

Incidental visual memory in a joint visual search

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Visual search is a familiar experience in our daily lives since we are exposed to multiple objects, and we also search with others such as searching during shopping. Previous studies have suggested that when people act together, they spontaneously take a partner's task into account and form memories of the self's task-related object as well as the partner's task-related object (i.e., the joint memory effect; Eskenazi et al., 2013). However, most of these findings have been examined under the cases which required two persons to simultaneously attend to one object and did not reflect search scenarios. We therefore investigated whether the joint memory effect depended on this simultaneous attending and whether it also facilitated a subsequent search for each other's target on their behalf. In this study, participant pairs searched for different targets in parallel and were repeatedly presented with the same search layouts. It can form associative memory with the target location, which shortens search time. Subsequently, a surprise recognition test was conducted in Experiment 1, and the joint memory effect was observed. In Experiments 2a and 2b, the recognition test was replaced with the transfer search, where one participant from each pair searched what the partner had searched and the other searched what nobody had searched. Search time did not differ within the pairs. These results suggest that the joint memory effect does not need simultaneous attending to form similar memories between the two persons. However, it may not necessarily serve future search.

Keywords: Joint Visual Search, Joint Memory Effect, Contextual Cueing Effect, Social Interaction
Presentation type: Oral presentation / Talk
Session: Better together? Benefits and costs of joint action

Group differences in OXT methylation between patients suffering from MDD and healthy controls: A replication study

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Stress is strongly associated with depression development and leaves traces in the epigenetic regulation of gene transcription. The oxytocin system has been implicated in allostatic processes promoting adaption to environmental stressors. Therefore, interactions of the oxytocin system with the environment, e.g., in form of methylation status of the gene coding for oxytocin, is a logical candidate for the investigation of the biological underpinnings of depression. Recently, we found hypomethylation of the oxytocin gene in patients suffering from depression as compared to healthy controls rendering a role for the oxytocin system in depression course likely. However, since the replicability of findings is a key point of criticism in (epi-)genetic research, we aimed at replicating our previous findings in a preregistered study in a new sample of $N = 85$ patients with MDD diagnosis and $N = 85$ healthy controls. We investigated DNA-methylation of the oxytocin gene, stressful life events and depression severity. As expected and in accordance with our earlier study, we found significant hypomethylation of the oxytocin gene – patients had lower methylation levels than controls – with regard to mean methylation and on the level of single CpG units. Methylation was not associated with critical life events, even though patients reported significantly more and more traumatic stressful life events in comparison to healthy controls. This study shows that hypomethylation of the oxytocin gene can be demonstrated in a reproducible fashion and provides further evidence for the involvement of the oxytocin system in depression.

Keywords: stressful life events, epigenetics, major depression, DNA methylation, oxytocin, replication
Presentation type: Poster Presentation
Session: Clinical and Biological Psychology

Envisioning the Future: 2023 Turkish Presidential Election Predictions

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Political elections have been characterized as important events that can shape individuals' collective memory (Hacıbektaşoğlu et al., 2023). The 2023 presidential elections in Turkey can be considered a critical stage in Turkey's political history, which has been argued to have a substantial impact on Turkish collective memory. In this study, 680 Turkish adults (90.4% female, *Mage* = 38.87, *SD* = 10.62) completed Episodic Information for Election Day (when will the elections be finalized, when will the final results be announced) and future thinking questions (what might happen if People's Alliance or Nation's Alliance wins), also the valence and the timing of the expected events. Results showed that 60.9% of participants anticipate first-round election finalization, and 86.3% expect the Nation's Alliance candidate to win. Moreover, the importance and valence that individuals attribute to the election change depending on the given future scenario: The Nation's Alliance win is viewed as more positive and important, while the People's Alliance win is seen as more negative and less important. While the sample was dominated by individuals expecting the Nation's Alliance to win, the variation in individuals' expectations was still linked with the content and the valence of Turkey's alternative future scenarios. Findings will be discussed focusing on the mechanisms underlying the alternative perspectives for the future.

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Keywords: Memory, Collective Memory, Collective Future Thinking, Presidential Elections.
Presentation type: Poster Presentation
Session: Human Factors I

Dual Senses, Divergent Strategies? Unique Patterns in Haptic Versus Visual Search Tasks

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This research investigates the influence of task difficulty on haptic search behaviors, extending the foundational work of Kristjánsson et al. (2014) on attentional constraints in visual foraging. The primary aim was to determine how variations in the similarity between targets and distractors affect search efficiency and strategy, as evidenced by changes in search time and target-type switches, phenomena well-documented in visual foraging. Participants, blindfolded, were tasked with identifying and retrieving 20 target objects from a tray under three distinct difficulty conditions. The findings revealed a higher frequency of target-type switches in both the easiest and most challenging conditions, with a notable increase in reaction times correlating with difficulty. Importally, exploratory analysis highlighted a profound influence of visual-categorical processing on haptic search efficiency, underscoring the complex interplay between sensory modalities in human cognition. A follow-up visual search experiment based on Kristjánsson's design revealed that the amount of target-type switches depends on categorical differences between the easy and medium difficulty conditions and not merely difficulty, which also explains our higher target-type switches in the easy and hard condition. These insights not only expand our understanding of visual and haptic search mechanisms but also underscore the importance of considering multisensory integration in search tasks in addition to visual spaces in isolation.

Keywords: attention, visual search, haptic search, foraging, multisensory integration
Presentation type: Poster Presentation
Session: Attention

Goals vs. transitions: Do desired states or desired changes underly ideomotor action control?

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Actions are represented in terms of their ensuing effects. This fundamental axiom of the ideomotor framework has been repeatedly demonstrated empirically, thus establishing that effect anticipations are vital for planning and executing goal-directed movements. Yet, the question of how effect anticipations shape action control has received less attention. While contemporary accounts of ideomotor action control often emphasize the importance of goals (i.e., anticipated end-states), historical formulations have also suggested the importance of desired changes (i.e., anticipated transitions). As previous findings can be explained by both accounts alike, we conducted a series of experiments to examine whether actions are represented in terms of end-states or transition. Our results consistently support the notion of transitional instead of goal-based representations, thereby providing an important step towards a further specification of the ideomotor framework.

Keywords: ideomotor theory; action control; effect anticipation
Presentation type: Poster Presentation
Session: Motor and Action Control

The Role of Symmetry in Object-based Attention

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Two perceptual features can be compared faster if they are part of a common object. This same object advantage has been demonstrated amongst others by Behrmann et al. (1998). However, the stimuli used by Behrmann et al. are either confounded with the orientation of the to be judged details (X-shaped stimuli, Exp. 1) or the perceived objecthood of the occluded stimulus is vastly reduced (V-shaped stimuli). In Experiment 1, we avoided these issues by implementing slightly curved X-shaped stimuli that remove the confounding with the orientation of the to be judged details and at the same time create a strong impression of two superimposed objects. In Experiment 1 we found that the target identity inverts the same object advantage, replicating a finding by Chen and Huang (2015). However, in the stimuli utilized in Experiment 1 target identity is still confounded with symmetry (Saiki, 2000). In Experiment 2, we avoided this confound by replicating this experiment with random superimposed objects thereby minimizing the symmetry of the stimulus configuration. As a result, we found the same object advantage both for identical and different stimuli. Moreover, the same object advantage does not depend on whether the object is shown in front of or occluded by the irrelevant object confirming a central finding of the Behrmann et al. (1998) study.

Keywords:
Presentation type: Poster Presentation
Session: Attention

The Role of Learning Strategies in Reactivity of Judgments of Learning

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Recent research revealed that predicting one's memory performance during learning (judgments of learning, JOLs) can alter memory performance (JOL reactivity). In particular, eliciting JOLs is found to enhance cued-recall performance for related word pairs (i.e., positive reactivity) and/or impair recall performance for unrelated word pairs (i.e., negative reactivity). It has been proposed that positive reactivity might occur because participants who make JOLs use more effective learning strategies than participants who do make JOLs. In two preregistered experiments (N = 130 undergraduates each), we examined (1) whether participants in a JOL group and a no-JOL control group differ in reported learning strategies and (2) whether these differences underlie JOL reactivity. In Experiment 1, participants studied weakly related and unrelated word pairs and reported their learning strategies for each pair after completing the cued-recall test. Experiment 2 conceptually replicated Experiment 1 by using a list of strongly related and unrelated word pairs and integrating the assessment of learning strategies in the cued-recall test. Both experiments revealed positive reactivity for related word pairs and negative reactivity for unrelated ones. Further, participants in the JOL group used less mental imagery and more retrieval practice for studying unrelated word pairs than participants in the control group. These differences in learning strategies partially accounted for negative reactivity for unrelated word pairs. Taken together, our findings indicate that altered learning strategies in the JOL group contribute to negative reactivity, but not to positive reactivity.

Keywords: metamemory, cued recall, reactivity, judgments of learning (JOLs)
Presentation type: Oral presentation / Talk
Session: Recent Insights on the Basis, Accuracy, and Impact of Metacognitive Judgments

Bayesian Inference Modeling of the Contributions of Belief and Experience to Metamemory in Source Monitoring

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Metamemory monitoring is based on prior beliefs about memory and/or processing experience during study (Koriat, 1997). Therefore, the relative contributions of belief and experience should explain how metamemory cues affect different metamemory judgments. The authors modelled participants' Bayesian inferences in metamemory monitoring (Hu et al., 2021) to compare the relative contributions of belief and experience to metamemory about item and source memory in source monitoring. The authors reanalyzed data from 17 participant groups in seven published studies (total N = 1100) that tested effects of schema-based expectations on metamemory and source monitoring. All participants studied expected and unexpected source–item pairs (e.g., "toothbrush in the bathroom" vs. "microwave in the bathroom") and made trial-wise metamemory judgments about item memory (Judgments of Learning, JOLs) and/or about source memory (Judgments of Source, JOSs). Later, actual item and source memory were assessed. As previously documented, participants showed expectancy illusions on JOLs and JOSs, that is, they predicted better item and source memory for items from an expected source, but actual item memory was unaffected by expectations and source memory was better for items from an unexpected source. The Bayesian inference model showed that belief and experience jointly contributed to metamemory judgments. In expected trials, belief and experience contributed equally to metamemory. In unexpected trials, belief contributed more than experience. Critically, the contributions of belief and experience explained differences between JOLs and JOSs. JOSs showed a stronger expectancy illusion and a stronger contribution of experience than JOLs. Reliance on belief was associated with weaker illusions.

Keywords: Metamemory, Prior Belief, Experience, Source Monitoring, Bayesian Modeling
Presentation type: Oral presentation / Talk
Session: Recent Insights on the Basis, Accuracy, and Impact of Metacognitive Judgments

Self-relevance modulates early attentional selection for perception

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Recognizing information that is relevant to ourselves is an important part of human information processing that allows us to quickly and accurately respond to potentially life-threatening situations. Many studies have shown that mere self-relevance can lead to behaviourally meaningful and robust processing benefits. However, the mechanisms via which this self-prioritization occurs remains unclear. While many processing stages are involved in its generation, some authors argue that self-relevance does not permeate to perceptual processing levels, but originates from higher-level, decisional processes. The present study used a TVA-informed temporal order judgement paradigm to assess the effects of self-association on early attentional selection for perception versus social discrimination. Across two experiments (each N = 70), we show that social association of arbitrary information leads to processing facilitation via increases in processing speed of self-associated perceptual objects. On the other hand, when participants have to discriminate the temporal order of information based on its social associations, this benefit is absent, suggesting the involvement of higher-level, compensatory mechanisms. Overall, these findings suggest that the relative social salience of self- over other-related information triggers a selective reallocation of attentional resources between the socially loaded perceptual objects. They further suggest that self-association leads to benefits of attentional selection at the level of the perceptual object and does not require the active decoding of social association for decisional processes.

Keywords: Self, Social relevance, Social salience, Attentional Selection, Theory of Visual Attention, Temporal Order
Presentation type: Oral presentation / Talk
Session: Progress in TVA-based Visual Attention Research: From Fundamentals to Applications I

Deepening Knowledge, Preserving Opinion: The differential Impact of Gamification within a Depolarization Intervention

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Concerning contentious topics, researchers have identified a rise in belief polarization linked to significant negative consequences for society, emphasizing the necessity for effective interventions. Despite the potential of methods like addressing filter bubbles, a critical challenge persists—individuals must actively seek and engage with these interventions. An innovative approach to address this challenge is gamification. Therefore, this study explores whether integrating gamification into a depolarization intervention can boost engagement and, consequently, enhance effectiveness. An established depolarization intervention method was utilized, presenting well-balanced arguments for and against the contentious issue of implementing a general speed limit on German Highways. A total of 269 participants (age: M = 44.86; SD = 14.37, 135 female) were assigned to one of three interventions: a traditional text-based intervention (reading balanced arguments on the contentious topic), a gamified intervention (engaging with these balanced arguments in a gaming context), or a control intervention (reading arguments on an unrelated topic). The study results did not reveal a general effect of the traditional text-based intervention nor an enhanced impact of the gamified intervention on depolarizing opinions. However, the gamified intervention led to an increased number of read arguments and improved knowledge about the topic, highlighting the independence of knowledge and opinions. Furthermore, political orientation influenced the depolarization effect, with right-leaning individuals demonstrating a more pronounced depolarization of their opinions. In conclusion, in the presence of pre-existing polarization and a politically much-discussed topic, the effect of imparting knowledge as a depolarization strategy is limited, suggesting the need for alternative approaches.

Keywords: belief polarization, intervention, gamification, speed limit
Presentation type: Poster Presentation
Session: Methods

Can we utilize Large Language Models (LLMs) to generate useful linguistic corpora? A case study of the word frequency effect in young German readers

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Large Language Models (LLMs) recently evolved to be able to generate long and coherent stories responding to specific prompts. Here, we utilize LLMs to create a text corpus to estimate word frequency specifically for German-speaking young readers (Grades 1-4). We build the LLM-corpus based on an existing corpus of children's books. We found that the LLM-corpus holds fewer word types but that the frequencies of relatively often occurring words were highly similar. Furthermore, we used the book and LLM-based frequencies to estimate the word frequency effect on reading performance (i.e., faster reading of more frequent words). LLM-based frequencies explained more variance in reading times for readers in Grades 1-4 than the children's book-based frequencies. Therefore, we conclude that LLM-based word frequencies reliably capture the frequency effect on reading performance and outperform conventional frequency estimates in beginning readers. It is thus possible to use LLMs to generate word frequency statistics for specific groups. We discuss these findings, considering the potential risks of using LLMs in this context.

Keywords: Reading, Word frequency effect, Large Language Models, young readers, old readers
Presentation type: Oral presentation / Talk
Session: Methods in reading and language research

Influence of ageing and task preparation on the modality compatibility effect in task-switching

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Modality compatibility (MC) describes the match between the stimulus modality and the modality of the anticipated response effect (e.g., vocal responses usually lead to auditory effects). Several task switching studies demonstrated larger switch costs when switching between two modality-incompatible mappings (auditory-manual and visual-vocal) compared to switching between two modality-compatible mappings (auditory-vocal and visual-manual). Interestingly, previous research on MC in dual tasks suggests that MC affects older adults more strongly than young adults. The aim of our current study was to determine whether this age-related effect transfers to task switching and moreover, whether specifically older adults benefit from longer preparation in this situation. In our experiment, we compared performance of younger and older adults in modality compatible and incompatible conditions, while varying preparation time. Stimuli were bimodal (auditory and visual), while unimodal cues indicated the relevant target modality. Participants had to identify the location of the target modality (left vs. right) in the previously assigned response modality (vocal or manual). As expected, we found a larger MC effect in task switching for older compared to young adults. Regarding preparation time, young adults tended to show more efficient task preparation, while the effect of MC was not affected by preparation time. Together, our findings indicate that older adults suffer more than young adults of the between-task backwards crosstalk that arises when switching between incompatible modality mapping; and that the the effect of MC remains independent of preparation processes.

Keywords: Aging, stimulus-response modality compatibility, crossmodal task switching, spatial attention switching
Presentation type: Poster Presentation
Session: Cognitive Control and Conflict I

Effects of an app-guided breathing exercise on endocrine, autonomic, and psychological parameters in adolescents after an acute stress situation

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Experiencing intense stress in childhood and adolescence can increase the likelihood of mental and physical illness. This makes learning adaptive coping strategies at an early age all the more important. A key component of stress management programs is the use of relaxation exercises, for example through slow, deep breathing as in heart coherence exercises (HCE, 6 breaths per minute, inhaling and exhaling for 5 seconds each). These breathing exercises are also increasingly being integrated into smartphones as part of health apps, although their effectiveness in acute stress situations has rarely been scientifically validated. The aim of the study was to investigate the effectiveness of an app-guided HCE (n = 36) after an acute stress situation (Trier Social Stress Test) in comparison to the natural relaxation (NR, n = 37) responses of healthy adolescents between 11 and 17 years. Therefore, endocrine, autonomic, and psychological stress parameters (cortisol, alpha-amylase, heart rate, heart rate variability, mood) were examined. Significant group differences were found in heart rate variability, with higher values in the low-frequency band and in the low-to-high frequency ratio for the HCE condition. These results may indicate improved physiological functions through the stimulation of vagal tone and baroreflex. Implications and the effectiveness of app-guided breathing exercises for stress management in adolescents are discussed.

Keywords: Health App, Slow Deep Breathing, Stress, Coping, Adolescents, Trier Social Stress Test
Presentation type: Oral presentation / Talk
Session: Innovative methods for assessing emotion recognition, interoception and stress processing in children and adolescents

Make Some Noise: Influence of Data Quality on AI-Supported Clinical Decision-Making

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In cardiac auscultation, physicians face the challenging task of distinguishing between normal heart sounds and pathological murmurs. Innovative technologies including AI offer potential clinical decision support (CDS). This study aims to investigate how different CDS-systems for digital auscultation affect physicians' decision-making under different conditions. We aim to understand differences in terms of diagnostic accuracy, diagnostic confidence and diagnostic calibration between systems that provide pure information analysis (IA) communicated via data visualization and systems that provide additional decision recommendations (DR). Furthermore, we want to investigate the influence of data quality on subjective perception (e.g., trust, perceived usefulness) and reliance on digital systems. To answer these questions, we use a 2 between (degree of automation: IA vs. DR CDS) x 2 within (data quality: noisy audio vs. normal audio recordings) x 2 within (T1=audio only vs. T2=audio with CDS) mixed design with a target sample size of N=36 physicians. Among other things, we expect the DR group to improve more in performance and diagnostic calibration, while the IA group is expected to improve more in diagnostic confidence. We hypothesize that noisy audio data will negatively affect the performance of participants in the audio only condition. In the DR condition, we expect that noisy audio data will negatively affect confidence and positively affect performance. We expect that both systems will be perceived as more useful when the audio is noisy, but hypothesize that the DR system will be perceived as even more useful. We will present results from a currently ongoing preregistered study.

Keywords: clinical-decision making, AI, trust in automation
Presentation type: Oral presentation / Talk
Session: AI and decision-making: Insights from varied applied settings

Online Conflict Navigation: Preparing the Terrain for Negotiation

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In the dynamics of interpersonal conflicts, parties often engage in highly emotional arguments about recent incidents, gradually losing sight of the root causes of the conflict and their own fundamental interests related to the issue at hand. This impedes the development of a lasting and mutually satisfying solution for all parties involved. To address this, objectives within mediation processes are to transfer participants' narratives from accusatory tones to factual reports, to elaborate own emotional responses and underlying interests. This process often necessitates multiple mediation sessions.
We will present the results of our experimental study, in which we explored whether lead questions in an online survey can assist in formulating a thoughtful conflict report, serving as a foundation for subsequent negotiation sessions. The lead questions focus on sequentially objectifying perspectives and on elaborating on the main interests and needs of participants to pave the way for a potential solution. We examine the hypothesis that compared to a control group, following lead questions, conflict reports may shift from heightened emotional and blaming content to greater reason, enhance parties' understanding of their own emotional responses and aims, while the evaluation of the conflict counterpart may not significantly improve through lead questions alone. Our concern is whether this approach could streamline and contribute to a more standardized mediation process.
Keywords: conflict, conflict communication, mediation, conflict resolution, standardization
Presentation type: Poster Presentation
Session: Interaction and Social Psychology

Distractor-Response Binding and Dimension Repetition Benefits – two sides of the same medal?

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Both attention and action control research investigate the influence of previous actions on present events. However, so far both areas of research have not had much overlap. In action control, distractor-response binding effects have been described that show retrieval-based interference / benefit effects for later events based in irrelevant distractors. In attention research, dimension-repetition benefits have been described that show response benefits when responding repeatedly to the same feature dimension (e.g., color). These effects not only share the same abbreviations (DRB) but also appear to emerge from a similar source. In this talk we will present data that fits this narrative. Specifically, we applied modulations known from action control to typical dimension-repetition experiments.
Keywords: action control, distractor-response binding, dimension-repetition benefits, attention
Presentation type: Poster Presentation
Session: Motor and Action Control

Measuring orthographic depth

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When reading researchers compare different languages, they generally focus on the effect of orthographic depth on reading ability, acquisition, and cognitive processing. For extending cross-linguistic reading research to multiple languages, we need to be able to objectively quantify the level of orthographic depth. Some measures have already been proposed (e.g., onset entropy, Borgwaldt et al., 2005; complexity and unpredictability, Schmalz et al., 2015). However, previous work has suggested that different dimensions underlie orthographic depth, and it is not always clear how the quantifications map onto the different underlying constructs. Here, we first examine how different measures relate to underlying theoretical constructs. Then, we quantify the relative depth of 8 European orthographies. We use both existing methods, and present two approaches which have not been previously used to quantify orthographic depth: Distance-based measures relying on the closeness of the phonology of orthographically similar words, and mutual information, as a theory-neutral approach. An exploration of the relationship between the different measures shows that they map on two separate dimensions, in line with previous theoretical work. The measures derived based on different theoretical assumptions largely show agreement, suggesting that, for our languages of study, all theoretical approaches are approximately equally suitable to understanding orthographic depth.

Keywords: Cross-linguistic language research, corpus linguistics
Presentation type: Oral presentation / Talk
Session: Methods in reading and language research

Different variants of feedback of overt attention measured by gaze during virtual social interactions

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Enhanced self-focused attention plays an important role in the maintenance and treatment of Social Anxiety. Actual developments use Virtual Reality (VR) for attentional training. However, no VR attentional training combining gaze-based feedback with exposure to social stimuli. Therefore, we investigate which characteristics of gaze-related feedback realized via eye-tracking lead to a positive valence as well as to an increase in focused attention on social stimuli. Additionally, we examine whether the effects differ between low socially anxious (LSA) and highly socially anxious (HSA) individuals.
In this randomized-controlled study participants were instructed to focus on virtual agents until feedback was given. Consequently, the participants' attentional focus was feedbacked using *visual social-internal* (smile of the target-agent), *auditory non-social external* (positive sound) and *auditory social-external* (verbal, positive statement) feedback, whose latency was also manipulated (after 3, 5 or 7 seconds). Evaluation of the feedback variants and latencies was measured during and after the experiment via ratings of valence and arousal. We further investigated participants' attentional focus on virtual agents after feedback was received. Results revealed a significant main effect of feedback variant for valence ratings as well as for focused attention. The smile of the target-agent was perceived as more pleasant and elicited more eye-contact than verbal, positive feedback, which was associated with higher valence than positive feedback-sound. Taking into account our exploratory analyses which revealed different effects between LSA and HSA individuals, this pilot study can be used as basis for further research on intervention to change attentional processes in Social Anxiety Disorder.

Keywords: social anxiety, self-focused attention, attention training, social interactions, virtual reality, exposure therapy
Presentation type: Poster Presentation
Session: Interaction and Social Psychology

Retrieval-induced forgetting of oculomotor sequences

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We examined retrieval-induced forgetting of eye movements. The items were intentionally encoded letter-cued eye movements, indicated by a moving box over a 6x6 grid on a computer screen display. These directionally categorized movements were animated across the screen from left-to-right or vice versa. Participants had to track the movements with their eyes, while remembering both, corresponding movement and letter cue. The learning phase encompassed six letter-cued eye movements over this pattern from left to right and six letter-cued movements in the opposite direction. After sufficient initial learning of these twelve eye movement sequences belonging to their categorial cue, retrieval-practice started. Half of the items of one movement category (e.g. left-to-right) were retrieval-practiced several times. In a subsequent cued recall test phase in Experiment 1, participants had to explicitly remember all letter-cued movements in a given order. Results showed retrieval-induced forgetting in an accuracy measure of recall, that is, significantly lower recall of non-retrieval-practiced eye movements belonging to the retrieval-practiced category as compared to the non-practiced category. In Experiment 2, the final test phase encompassed an indirect test. Here, participants were not demanded to remember the letter-cued sequences, instead they had to execute these movements by following a new indicator on the screen, representing the eye movement in an indirect manner. Results here also showed retrieval-induced forgetting of eye movements, this time in significant longer execution time for the inhibited movements. In summary, we demonstrated retrieval-induced forgetting of eye movements in a direct (Experiment 1) and indirect (Experiment 2) testing procedure.

Keywords: Retrieval-induced forgetting, eye movements, cognitive inhibition, memory
Presentation type: Poster Presentation
Session: Memory and Learning I

Unraveling Biases: Exploring the Interplay of Implicit and Explicit Homophobia and Sexual Preference in Young Adults

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In an era marked by increasing awareness of diversity, a tolerant and inclusive society can be fostered when we better understand implicit and explicit biases.
In our study, 101 homo-, bi- or heterosexual young adults (70 women, 31 men), participated in an Implicit Association Test (IAT) on homophobia and an IAT on sexual preference, and completed self-report questionnaires on homophobia and on sexual orientation (SO). The final sample will comprise 120 students, so the here reported results are preliminary.
While the explicit attitude towards gay and lesbian persons is very positive across participants, with no effects of SO, men compared to women have a less positive attitude towards gays and lesbians. Small correlations between explicit attitudes and homophobia-IAT-scores exist. However, contrary to the explicit measure, the homophobia-IAT shows an effect of SO, but no effect of gender. Homosexual persons show the strongest positive association of homo with good, heterosexual persons the lowest, with bisexual participants in between. On average, only small preference effects occur.
Explicit and implicit measures of sexual preference are not correlated. However, the IAT reveals an effect of gender, and an interaction of gender and SO. While homosexual and bisexual women, and heterosexual men show a moderate preference for women, heterosexual women and bisexual men show a small preference for women, homosexual men show no preference.
Our data reveal group and gender specific differences in experimental measures and build a basis to debate on the differences between explicit and implicit attitudes regarding homophobia and sexual preference.

Keywords: ingroup bias, implicit association test, gender, sexual orientation, sexual preference, homophobia, stereotypes
Presentation type: Poster Presentation
Session: Clinical and Biological Psychology

Learning to Read Connections - Sensitivity to Collocation Frequency as Predictor for Reading Comprehension in Children

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The collocation frequency of words in the language environment contributes to early vocabulary development. Vocabulary size, in turn, predicts children's reading comprehension skills later in development. Both collocation frequency and reading comprehension have been linked to inferential reasoning at different points in development. Here, it was hypothesized that 8-year-old children's (N = 147; 76 female) sensitivity to collocation frequency would be related to vocabulary size and reading comprehension skills of varying complexity.

Participants completed an auditory thematic judgment task to assess their sensitivity to collocation frequency (response accuracy or speed). In the task, children were presented with a short sentence containing a reference word (e.g., "John sees the cloud.") and asked to judge which of two subsequent words best fit the sentence (e.g., "rain" or "lip"). Semantic relatedness between reference and test words was based on a corpus-based analysis of collocation frequency.

Multilevel and mediation analyses confirmed that thematic judgment responses were related to corpus-based measures of collocation frequency, and were associated with vocabulary size and reading comprehension at the sentence and text levels. Furthermore, thematic judgment predicted vocabulary size and reading comprehension when controlling for the relationship between decoding and reading comprehension.

The study highlights the sensitivity of collocation frequency as a link between early language comprehension development (in terms of lexical retrieval and inference) and reading comprehension in middle childhood. It also integrates theoretical approaches from distributional semantics computational network analysis and behavioral experimental studies.
Keywords: Collocation Frequency; Corpus Analysis; Reading Comprehension; Language Comprehension; Childhood; Thematic Judgment Experiment; Network/ Distributional Theory
Presentation type: Oral presentation / Talk
Session: Methods in reading and language research

Kinematic readout of confidence in collective decision-making

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Research on collective decision-making has shown that groups can outperform their best individual members through "confidence sharing": individuals verbally communicate how confident they feel in their individual judgements so as to arrive at a collective decision. However, such explicit communication of confidence estimates may not always be possible. Thus, in the present study, we investigate an alternative, implicit way of confidence sharing. We test the hypothesis that, in the absence of verbal communication, two individuals can infer each other's subjective confidence through simple action observation, and in this way achieve a group benefit. To this end, we ask two participants (A and B) to solve a 2AFC perceptual task, with individual decisions followed by a collective decision. Participants express their decisions by aiming for one of two targets, while movement kinematics are recorded. In each trial, participant A (B) aims for one of the two targets, then observes participant B (A) also aiming for one of the two targets, and then makes the collective decision. Our results show that participants perform better collectively, and that they read out confidence from each other's movements and incorporate this inferred confidence in the collective decision-making process.

Keywords: collective decision-making, confidence, action observation, movement kinematics
Presentation type: Oral presentation / Talk
Session: Better together? Benefits and costs of joint action

Decisions From Experience: A Drift Diffusion Model Analysis of Autonomous Sampling Behavior

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When people interact with their environment, they acquire an understanding of its probabilistic structure through experiences. The premise of the decisions from experience paradigm (Hertwig & Erev, 2009) is that people base their decisions on their experiences. In this study, we offer a psychoeconomic and psychocognitive account for decisions from experience and propose answers to the questions on how one's probabilistic environment and sample size influence decision-making and how learning is reflected in autonomous sampling behavior. We presented $N = 60$ participants with an adaptation of the sampling protocol and conducted choice and reaction time (RT) analyses including a drift diffusion modulation (DDM). Regarding the psychoeconomic choice analysis, the ambiguity of one's environment holds a greater influence on the accuracy of one's decision-making than the quantity of one's experiences. Furthermore, with cumulating experiences, people's proximal perception converges with their distal environment and people tend to base their choices on their experiences. Regarding the psychocognitive RTs analysis, we observe a decline of RTs throughout a sampling phase and qualitative differences between a decision to continue sampling and the decision to stop sampling. These can be explained by variations in cognitive parameters of the DDM between the beginning and end of a sampling phase. People seem to exhibit a general bias toward exploring their environment and maintaining their autonomy, a decrease in the amount of evidence to be accumulated, and differences in evidence accumulation itself. Investigating learning in autonomous sampling behavior through DDMs seems to be a promising path for future research.

Keywords: decisions from experience, drift diffusion model, sampling, decision-making, social cognition
Presentation type: Poster Presentation
Session: Decision Making

The True Nature of the Congruence-Incongruence Effect and Varying Learning Trajectories in Multiple-Cue Probability Learning

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Examining the influence of cue saliency in multiple-cue probability learning paradigms, we used a modified weather prediction task (Knowlton et al., 1994) to conduct two experiments (Ntotal = 258) on (in)congruency-dependent differential learning dynamics. In Experiment 1, the subjects had four faces as cues to predict a binary outcome ("truth" vs. "lie"). The hierarchy of a face's trustworthiness was either congruent or incongruent to the face's forecasting validity for the positively valenced outcome "truth". Consequently, people experiencing incongruency learned the ecological validities of trustworthy faces being associated with the outcome "lie" and untrustworthy faces associated with the outcome "truth". In contrast, people experiencing congruency learned the associations vice versa.
Notably, the incongruency group yielded lower accuracy rates than the congruency group, both groups displaying unique learning trajectories. As evidenced by distinct cue utilization curves detected by the rolling regression method of Lagnado and colleagues (2006), incongruency causes more uncertainty and a delayed strategy optimization. In Experiment 2, using the same experimental design as in Experiment 1 except for introducing two different scenarios (witness- and gambling door-scenario) with different binary outcomes ("truth" vs. "lie" and "win" vs. "loss"), we explored the true nature of the effect. Specifically, we scrutinized whether it reflects a socially relevant dimension affecting a social judgment criterion, or whether it is merely based on the association of similarly valenced cues/outcomes (positive vs. negative).
Keywords: probability learning, trustworthiness, cue-saliency, learning-dynamics
Presentation type: Oral presentation / Talk
Session: Misinformation

Do older adults particularly benefit from conceptual emotional Sources? A replication and extension of May et al. (2005)

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Since May et al. (2005) found a benefit in source memory for conceptual emotional sources in older adults, which was strong enough to eliminate the otherwise existent age-related source memory deficit, it is generally assumed that emotional source memory is spared from aging. To replicate their results, we conducted an online experiment, where 198 younger and 198 older adults were presented with food items left or right on the screen. The screen location (perceptual source) was either indicative of the serving temperature (conceptual nonemotional source) or food safety (conceptual emotional source). Participants were then either tested on the perceptual or conceptual source. This resulted in a 2 (age group: younger vs. older adults) x 2 (study: emotional vs. nonemotional) x 2 (test: perceptual vs. conceptual) between-subjects design. To check whether food safety was indeed perceived more emotional than food temperature, we implemented two additional groups, who rated each studied food item on valence and arousal. Ratings confirmed the emotionality of the source manipulation, but neither younger, nor older adults' source identification performance benefitted from the emotional conceptual sources, contradicting May et al.'s findings. Further surprisingly, older adults showed better source identification performance than younger adults. Additional analysis using multinomial processing tree modeling to control for guessing bias revealed a source memory benefit for the emotional study conditions in younger but not older adults. Thus, our findings rather contradict the idea that emotional source memory in particular is spared from aging.

Keywords: aging, source memory, emotion , multinomial modeling
Presentation type: Oral presentation / Talk
Session: Source Memory

Localizing binding effects: How to find binding and retrieval in localization performance

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Discriminating features of sequentially presented stimuli typically leads to effects of binding and retrieval marked by partial repetition costs: Repeating a response but changing a response-irrelevant feature impairs performance compared to a full repetition. In contrast, changing a response is impaired by repeating a response-irrelevant feature compared to a full change. Yet, these stimulus-response binding effects are typically not found when localizing visual stimuli: In such tasks – in which location repetitions and changes are systematically varied with repetitions and changes of nonspatial target identity (e.g., color) – there is often simply a location repetition cost, known as inhibition of return, unmodulated by repeating or changing the nonspatial target identity. Yet, it is possible to observe binding effects in localization performance. In this talk, we will give examples on how to do so, for example, by using a spatially incompatible response mapping, by changing the nonspatial information on a feature dimension level, or by presenting targets auditorily. Crucially, all these recent findings are based on combining ideas of action control, attentional orienting, and visual search, suggesting that an all-encompassing understanding of human selection and processing can be gained by incorporating different research strands of cognitive psychology.

Keywords: Action control, Stimulus-Response Binding, Attentional Orienting, Inhibition of Return (IOR), Visual Search, Task dependence
Presentation type: Oral presentation / Talk
Session: Episodic Binding

Driving 'Miss Daisy' – Do we love our car more if we name it? A study on anthropomorphism

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Anthropomorphism describes the tendency to assign human attributes, such as personality, emotions or intentions, to non-human entities, such as animals or inanimate objects. Factors that determine or influence anthropomorphism include the human's need for social contact or the object's appearance and movement. In the present study, we investigate whether naming – assigning a personal, individualized designation to a specific object, device or appliance – leads to anthropomorphism independently of other factors. Our experiment used an online questionnaire to examine the effects of different modes of naming, e.g. to see whether first naming a specific a motor vehicle and then calling it Schorsch or Flitzi rather than referring to it by no name at all ('the car'), by the company or brand name ('ACAR 180), or a pre-chosen proper name ('Speedy') would increase the likelihood of anthropomorphism and its attendant effects. The study found that a self-chosen proper name was associated with significantly higher values in terms of anthropomorphism than at least one other mode of naming. These findings have potential applications in marketing, such as increasing consumer referrals or product sales.

Keywords: anthropomorphism, names, naming, objects, devices, self-selected name
Presentation type: Poster Presentation
Session: Metacognition

Evaluation of a User Interface Displaying Augmented Video Streams to Support Remote Assistants of Highly Automated Vehicles

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Remotely operating vehicles enables the effective use of vehicle automation even when fully automated driving is not feasible. A human operator ensures safety and availability from afar and supports the vehicle automation when its capabilities are exceeded. The vehicle's remote assistant, legally defined as a Technical Supervisor ("Technische Aufsicht"), is a prerequisite to operate highly automated vehicles (SAE 4) on public roads in Germany. Assessing traffic situations and providing effective assistance heavily depends on the video stream from the surroundings of the supervised vehicle. However, view-obstructing objects, adverse weather and light conditions, as well as poor video resolution may deteriorate the remote assistant performance regarding the correct assessment of traffic situation and adequate decision-making on how to react to a given traffic situation that the vehicle's automation cannot handle on its own. This talk presents HMI concepts for how to augment the video stream as a part of the remote assistant's workplace. The HMI concepts were evaluated in an experimental user study regarding their performance, workload, situation awareness, and usability. The results of the study inform the iterative workplace development and further research on the remote assistance of highly automated vehicles.

Keywords: remote operation, remote assistance, human-machine interface, Technical Supervisor ("Technische Aufsicht"), highly automated driving
Presentation type: Oral presentation / Talk
Session: Experimental Engineering Psychology and Human Factors II

Linking Actions and Memory: The Influence of Action-Effect Congruency on Agency Perception and Recognition Memory

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When humans act, they produce perceptual changes through motor activity. Doing so typically goes along with the experience of agency over the produced perceptual change. Here we investigated how the spatial relationship between motor activity and ensuing perceptual changes shape agency experience and memory for the produced event. Participants engaged in a task where they responded to a visual stimulus—a white box—by executing self-decided up or down key responses. Subsequently, the box moved either spatially congruently or incongruently to the participants' response. After the box stopped moving, a word was revealed within it. A recognition memory test for these words was conducted later. After each trial, participants rated their sense of agency. In one condition, trial order was random, and thus congruent and incongruent trials were presented intermixed, whereas they were presented in blocked sequences in another condition. Results showed a higher sense of agency following congruent as compared to incongruent trials, and a higher sense of agency given a blocked rather than mixed trial order. Recognition memory was better for words occurring in congruent trials as compared to incongruent trials, with no effect of trial order. However, this effect was small and only reliably found when collapsing across the different trial order conditions. An additional investigation of effects of changes in control between two consecutive trials yielded no effect of control change on memory. These findings highlight the impact of action-effect congruency on perceived control and suggest its potentially facilitating effect on memory.

Keywords: recognition memory, action-effect congruency, sense of agency
Presentation type: Poster Presentation
Session: Memory and Learning I

Does Physical Activity in Oder Adults Improve TVA Parameters and Other Cognitive Measures?

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Physical exercise is suggested to enhance cognition in older individuals, however, evidence from randomized controlled trials (RCTs) is scarce. We thus carried out an RCT on 93 healthy older participants to evaluate the impact of an 8-week online-based physical activity intervention on cognitive functions. Participants were randomly assigned to 8 weeks of online interventions of either multicomponent physical activity focusing on aerobic but including coordination and balance exercises, or active control comprising relaxation and podcasts on aging topics. The primary outcome was the change in parameter visual processing speed *C*, derived from a TVA-based whole report task. VO_2max and various neuropsychological test scores were additionally assessed. Although significant VO_2max gain was only found for the physical activity group, we did not find a significant group x time point interaction indicating gains compared to the control group. Similarly, although only the physical exercise group showed enhanced visual processing speed *C*, the interaction was not significant. Significant group x time point interactions for visual memory and executive functioning indicated higher gains in the physical exercise group for these functions. Visual memory gain was furthermore related to VO_2max gain in the physical exercise group. We assume that the lack of VO_2max gain differences between groups was due to already above-average scores at baseline, limiting "room for improvement". Nevertheless, the study results imply that an increase in physical fitness leads to the enhancement of attentional, memory, and executive functions in the elderly.

Keywords: cognition, physical activity, online intervention, healthy, older adults, TVA
Presentation type: Oral presentation / Talk
Session: Progress in TVA-based Visual Attention Research: From Fundamentals to Applications II

Effects of information relevance communication on novices' experience and performance with a cooperative ultrasound diagnosis system

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Novices may particularly benefit from medical artificial intelligence (AI) in diagnostic tasks, e.g., ultrasound-based diagnosis. However, novices often have limited domain knowledge, which hampers their ability to understand how a medical AI processes information and could negatively affect cooperation. The present research investigates the effects of communication of diagnostic information between humans and medical AI. Based on an initial experiment with $N = 30$ laymen, we designed interactions highlighting the users' influence on information (i.e., short ultrasound video recording) used by the system. To this end, we identified information that 1) is under the user's control and 2) is where the system cannot monitor the quality. In a second between-subject experiment with $N = 40$, medical novices were either instructed to apply wrong pressure levels within the ultrasound examination proactively and to observe effects on the system information processing or only received basic instructions to conduct the examination. We examined Subjective Information Processing Awareness and the relation between reported confidence and performance regarding diagnostic quality. Results indicated that instruction to manipulate the information provided by novices' actions explicitly and to observe effects on the system impacts the development of diagnostic quality.

Keywords: Human-AI Interaction, Medical AI, Automation
Presentation type: Oral presentation / Talk
Session: Experimental Engineering Psychology and Human Factors I

Adaptive eye movements in gamified interception task

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Eye movements are usually studied under highly restricted and repeated conditions. To bridge the gap to natural sequential behavior while maintaining experimental control, we used a gamified interception task. Eye, head, and hand movements of participants playing an iPad-based game (Pong) were measured and gaze was mapped onto the tablet via computer vision algorithms. Participants attempted to hit a moving target (ball) by controlling a paddle on the lower part of the screen and scored points whenever an automated opponent missed the ball. We tested whether participants adapted their movements with respect to i) the impending action, ii) errors, after missing the target, and iii) prolonged exposure to experimental conditions, where paddle size and target speed were manipulated. Results showed adaptation of behavior on multiple levels: (1) Participants carefully timed their eye and hand movements with respect to the next action: They closely pursued the target with their gaze shortly before intercepting themselves. Blinks were clustered at times shortly after their own or the opponent's action. (2) Participants initiated hand movements earlier after misses. Within trials and across participants, better performance in the game was associated with more pursuit eye movements and fewer head movements just before interception. (3) After long exposure, participants pursued the opponent more often compared to the beginning of the experiment, although overall behavioral patterns stayed roughly consistent. Together, these results indicate flexible adaptation of eye, head, and hand movements for a given situation, but stable behavioral patterns across prolonged exposure which are related to performance.

Keywords: eye movements, interception, action, smooth pursuit
Presentation type: Oral presentation / Talk
Session: Action Control

The rubber hand illusion as a bodily detachment reaction in response to emotional vocalizations: Evidence from a clinical study in patients with dissociative symptoms

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Dissociation has been found to be connected to detached emotion experience and unstable body boundaries. For this reason, this study aimed to explore the impact of emotional vocalizations on the sense of body ownership in individuals with high and low levels of dissociative symptoms. The sample comprised 75 adolescents, including 25 healthy controls and 50 patients with non-suicidal self-injurious behavior, assigned to a low (n=25) and a high dissociation (n=25) group. First, interoceptive abilities were measured in a heartbeat detection task. Subsequently, six trials of the rubber hand illusion were performed, while participants listened to neutral, sad, or fearful vocalizations. Throughout the illusion induction and during resting baseline, physiological measures (heart rate, electrodermal activity) were recorded. Post-trial assessments included the rubber hand illusion questionnaire (RHIQ), acute dissociation, mood, and the proprioceptive drift. Results regarding the RHIQ showed that fearful vocalizations induced a stronger illusion in the low dissociation group, whereas the high dissociation group exhibited elevated illusion scores across all conditions. Additionally, positive relations emerged between illusion measures, subjective arousal, and acute dissociation. Besides, an inverted U-shaped relation was found between acute dissociation and arousal. In conclusion, our findings suggest that detached emotion experiences may lead to a higher plasticity of body boundaries which manifests in a stronger illusion.

Keywords: Rubber Hand Illusion, sense of ownership, emotion, dissociation, arousal
Presentation type: Poster Presentation
Session: Clinical and Biological Psychology

Episodic memories as generative models for action prediction

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Brain responses elicited during action observation have been interpreted as reflections of spontaneus predictive processes. It is assumed that such predictions have a multi-level structure, especially if the observed actions are complex, as is usually the case in everyday life. In a series of fMRI studies, we addressed the question of whether episodes can function as higher-order prediction models during action observation. Subjects encoded actions as short episodes that were later retrieved using partially manipulated cues. The behavioral and neural effects of episodic prediction and episodic prediction errors are discussed. Findings suggest that cortical midline and hippocampal structures may provide higher-order input to lower-level cortical areas in everyday action observation.

Keywords: Action observation, episodic memory, prediction error, functional Magnetic Resonance Imaging, Hippocampus
Presentation type: Oral presentation / Talk
Session: Cognitive and Neural Processes Underlying the Perception of Actions, Scenes and Objects II

CANCELLED - Inhibitory control and affect

Stefanie Schuch
RWTH Aachen University (until 02/2023)

Cognitive control and affect are closely linked. Here I will focus on inhibitory control on the task-set level, which enables human beings to quickly and flexibly change between different task goals. I will highlight a few aspects of the mutual relationship between control and affect. On the one hand, sustained affective states modulate control processes; on the other hand, cognitive conflict and/or the control of cognitive conflict are associated with affective signals. A selection of empirical studies will be presented investigating the affective modulation of task-level inhibition and conflict adaptation, as measured by N-2 task repetition costs and congruency sequence effects, as well as the affective connotation of N-2 task repetition costs. In the former case, affective states are experimentally induced; in the latter case, affective tunings are measured in several ways. I will close with some theoretical considerations on the link between control and affect.

Keywords: inhibitory control, affect
Presentation type: Oral presentation / Talk
Session: Affect, motivation and control II

The importance of standardised approaches for experimental research

Thomas Schultze
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In a globalised scientific community, it is common that different researchers work on similar topics, especially if these topics are novel or of broad societal interest. In the context of experimental research, this often goes along with each researcher or team of researchers using their own specific methods, including the definitions of the relevant constructs, their operationalisation, and the experimental paradigms. This variability in approaches is advantageous when the aim is to establish the generalisability of robust phenomena. However, in earlier stages of the knowledge generation process, it may be preferrable to use standardised approaches, meaning that different researchers use the same experimental paradigms and operationalisations of dependent and independent variables. Such a standardised approach does not only provide a basis for easy comparability of results, but also enables researchers to identify core phenomena, that is, robust patterns that arise across studies. Knowledge of such core phenomena is relevant because they define what theoretical approaches must be able to explain. I will demonstrate the usefulness of standardised approaches to experimental research in the context of laboratory research on advice taking.

Keywords: meta-science
Presentation type: Oral presentation / Talk
Session: Towards a Sustainable Experimental Psychology: Theory, Replicability, Behavior

Does less persuade more? Paradoxical effects of additional weak arguments

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When persuading someone, there is a tendency to include as many arguments as possible. However, is more always better? This question becomes especially important when dealing with arguments of different strengths. Combining a weaker argument with a stronger one can result in three potential effects: an increase, decrease, or no change in persuasive impact. These effects are linked to distinct patterns of information integration (adding, averaging, absorbing). In the adding pattern, each supporting argument enhances a positive attitude cumulatively. Averaging involves calculating the average persuasive strength of individual pieces of information. Absorbing lets the strongest argument overshadow all others. To explore how these different processing patterns affect the persuasive impact of arguments varying in strength, an online experiment was conducted using a five-group between-subjects design (N = 279). The control group received only one strong argument, whereas the experimental groups received four additional weak arguments. The groups differed in instructions and visual presentation to encourage averaging, adding, or absorbing, respectively. Results supported the averaging effect, where weak arguments decrease the persuasive impact of a strong argument. However, when the focus shifted to the strongest argument (absorbing pattern), no difference in persuasive impact between a standalone strong argument and one presented alongside weak arguments was found. In summary, the results indicate that it is not the sheer number of arguments that impacts persuasion, but a variety of factors, including the argument strength and patterns of information processing.

Keywords: persuasion, argument strength, information integration, adding, averaging, absorbing
Presentation type: Poster Presentation
Session: Interaction and Social Psychology

Multimodal language: A pilot study on gesture-speech integration of logical "yes" and "no"

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Gestures can carry semantic meaning and provide redundant or additional information related to the content of verbal utterances (Arachchige et al., 2021). A recent meta-analysis revealed that bimodal communication indeed moderately improves comprehension (Dargue et al., 2019). Gestures referring to affirmation or rejection are an ideal testing ground for the interplay of speech and gesture. We therefore aimed to investigate whether the compatibility of verbal and gestural information of logical "yes" and "no" affects the performance in a two choice decision task. In each trial, a blue and a green box appeared next to each other on the screen and participants were asked to indicate the location of a ball ("Is the ball in the blue/green box?"). We presented short video clips including a verbal answer of "yes" or "no" and an affirmation (head nod; thumb up) or rejection (head shake; thumb down) gesture. Crucially, verbal and gestural information matched or mismatched and participants were asked to choose the correct box based on the verbal clue in one half of the experiment and based on the gestural clue in the other half of the experiment. We observed that responses were faster in trials with a match (vs. mismatch) of verbal and gestural information when the critical clue was affirmative. This indicates that gesture-speech matches selectively facilitated affirmation. We will discuss possible explanations for this pattern of results, including the idea that the processing of rejection activated inhibitory resources that interfered with the integration of information from the task-irrelevant input channel.

Keywords: language comprehension, gesture-speech integration, affirmation, rejection
Presentation type: Poster Presentation
Session: Language

Hysteresis in posture selection in preschool children

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In sequential actions, posture plans are reused to reduce planning cost. The present study investigated whether this cost optimization principle, termed motor hysteresis, is already established at an early developmental stage. To this end, 22 preschool children (mean age=5.1a, 11 males) were tested in a sequential reaching task: opening a column of slotted drawers, once in an ascending and once in a descending order. The selected posture (over- vs underhand grasp) was documented for each drawer and order. If motor hysteresis existed in preschool children, a persistence in the previous posture was expected. A GLMM with a logistic link function, fixed effects for 'order' and 'drawer height', and a random effect for 'subject id' showed a main effect of 'drawer height', $z = 6.468$, $p < .001$, $R^2_{\beta*} = .005$, indicating that children used an underhand grasp for the lower and an overhand grasp for the higher drawers. More importantly, the GLMM showed a main effect for 'order', $z = 3.363$, $p < .001$, $R^2_{\beta*} = .001$: The children persisted in an overhand posture in the descending and in an underhand posture in the ascending sequences. These findings show that children adapt their grasp posture to height, but persist in a former posture in a sequential reaching task. The fact that motor hysteresis is already established at such an early developmental stage emphasizes its importance as a cost optimization principle for motor planning and is consistent with the results demonstrated in adults.

Keywords: motor planning, motor hysteresis, motor development, preschool children
Presentation type: Oral presentation / Talk
Session: Motor Development and Cognition

Does sense of agency serve as an action motivator?

Katharina Schwarz
University of Würzburg

Voluntary actions are accompanied by a sense of control over that action and its effects, and this perceived control, or sense of agency, serves as a precursor for the agent's perceived responsibility over the action outcome.
However, its conceptualization implies that sense of agency is more than an evaluation system for past actions and, instead, serves as a potentially powerful action motivator affecting future action decisions. In this talk, I want to look at theoretical considerations as well as scientific evidence that this may be indeed the case with sense of agency potentially affecting action selection and/or providing the motivation to act at all. Moreover, I want to showcase a more applied approach inspired by this assumption that asks how different levels of sense of agency may affect real-world challenges such as environment protection behaviour.

Keywords: sense of agency, perceived control, actions, motivation, action decisions, environment protection behaviour
Presentation type: Oral presentation / Talk
Session: Sense of agency in action: The influence of control experience on goal-directed behaviour

Memory effects of visual and olfactory landmark information in human wayfinding

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Justus Liebig University Gießen Experimental Psychology and Cognitive Science

Non-human animals are exceptionally good at using smell to find their way through the environment. However, the use of olfactory cues for human navigation is often underestimated. Although the sense of smell is well-known for its distinct connection to memory and emotion, memory effects in human navigation using olfactory landmarks have not been studied yet. Therefore, this article compares wayfinding and recognition performance for visual and olfactory landmarks learned by 52 participants in a virtual maze. Furthermore, it is one of the first empirical studies investigating differences in memory effects on human navigation by using two separate test situations one month apart. The experimental task was to find the way through a maze-like virtual environment with either olfactory or visual cues at the intersections that served as decision points. Our descriptive results show that performance was above chance level for both conditions (visual and olfactory landmarks). Wayfinding performance did not decrease one month later when using olfactory landmarks. In contrast, when using visual landmarks wayfinding performance decreased significantly, while visual landmarks overall lead to better recognition than olfactory landmarks at both times of testing. The results demonstrate the unique character of human odor memory and support the conclusion that olfactory cues may be used in human spatial orientation. Furthermore, the present study expands the research field of human wayfinding by providing a study that investigates memory for landmark knowledge and route decisions for the visual and olfactory modality. However, more studies are required to put this important research strand forward.
Keywords: Wayfinding, Recognition, Spatial Cognition, Odor Memory, Olfaction, Landmark
Presentation type: Poster Presentation
Session: Memory and Learning II

Central nervous and mental representations of odors

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How do odorants map onto the brain and how does the brain recognize, categorize and discriminate odors? In this talk I will review current behavioral and neuroimaging approaches that address the mental and neural representation of odors in humans, in particular how we study the representation of odors as representations of dissimilarity.
On the behavioral side, we use such dissimilarity representations and interpretable artificial intelligence to uncover a putative multidimensional representation of odors. In terms of neuroimaging, we use multivariate techniques such as representational similarity analysis to identify brain areas that share behavioral and neural representations of odors.
We will furthermore address how stable perceptual and neural representations can be identified despite piriform cortex expressing individualized representations and representational drift.
Keywords: olfaction, smell, representational similarity analysis, neuroimaging, interpretable artificial intelligence
Presentation type: Oral presentation / Talk
Session: Cognitive and Neural Processes Underlying the Perception of Odors

Practice-induced changes in frontoparietal and temporal-occipital representations during task switching in children

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Flexibly adapting to changing environments and switching between tasks is crucial for goal-directed behavior. Task switches require the updating of the relevant task set and the inhibition of the no-longer relevant set, resulting in lower performance on trials requiring a task switch vs. repetition (i.e., switch costs). While children show greater switch costs than adults, presumably due to less distinct task-set representations, age differences can be mitigated by training. Studies in adults suggest that neural task-set representations become more distinct with training and thus enable faster processing in the lateral prefrontal cortex (lPFC). However, it is still unclear how changes in neural representations contribute to training-related improvements of task switching in children.
We addressed this question using multivariate pattern analysis (MVPA) of fMRI data in children (8–11 years) that completed nine weeks of task-switching (N=32) or single-task (N=30) training. Pre-training, neural task-set representations were less distinct on switch compared to repeat trials. This effect did not differ between children and adults (20–30 years, N=53) that completed the pre-training fMRI session only. With training, children in the task-switching training group showed improved performance, accompanied by decreased activation in lPFC. However, MVPA showed that task-set decoding accuracy in the lPFC did not change with training. These results suggest that intensive training of task switching in childhood might be related to general improvements in meta-control processes, as evident in reduced activation in brain regions supporting the management of relevant rules, rather than to increasing distinctiveness of the specific task-set representations.

Keywords: task switching, training, childhood, neuroimaging, MVPA
Presentation type: Oral presentation / Talk
Session: Changes for learning: how do changes in task-specific representations shape adaptive cognitive control?

Are prequestions more beneficial for learning than learning objectives?

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University of Passau

Giving students questions that they typically cannot answer before a lesson or before reading a text has been demonstrated to improve learning of the upcoming lesson or text. This prequestion effect has been attributed to focusing of attention as well as to additional benefits of (unsuccessful) attempts to answer the questions. However, prequestions are typically only contrasted with a condition in which participants just read the text. In our experiment, we tested whether prequestions provide greater benefits not only compared to just reading, but also to studying learning objectives, and whether a potential benefit is restricted to overlapping questions in a final test. Like prequestions, learning objectives should help focus learners' attention but unlike prequestions, they should not prompt answering attempts. 156 participants were randomly assigned to the learning conditions "prequestions", "learning objectives", and "reading only". In the final test, they answered old multiple-choice questions (i.e., previously addressed in the prequestions or learning objectives) and new ones. In the old questions, there was a trend toward an advantage of prequestions over learning objectives and reading. Performance on the new questions was not affected by the learning condition. The findings indicate that prequestions may benefit learning over and above focusing learners' attention. However, a control variable that determined which questions were old and new unexpectedly affected the findings. Therefore, we are currently running a follow-up experiment with modified materials.

Keywords: prequestions, pretesting, test-enhanced learning
Presentation type: Oral presentation / Talk
Session: Enhancing Learning and Memory

Superiority of Multimodal Vocabulary Learning? An investigation with L1 German-speakers learning Persian

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Previous research has demonstrated that the integration of gestures into foreign language pedagogy benefits vocabulary learning. Nevertheless, there is only limited evidence for this central hypothesis and many questions are left unanswered. For instance, it still needs to be explored whether sensorimotor-enrichment effects during foreign language learning generalize to languages with lower degrees of similarity to the first language. In the present study we therefore investigated the potential benefits from sensorimotor-enriched instructions on learning a foreign language with a rather low degree of similarly to the participants' first language. More specifically, we recruited young adult native speakers of German (N=80) and taught them the Persian translations of sixteen German words. In the training phase, participants learned the Persian words and their German translations either through a traditional vocabulary learning method or through multimodal stimulus presentation. In the testing phase, participants completed a recall test and two translation tests. The results did not corroborate the findings from previous studies as we did not observe reliable differences between the two instruction groups. We discuss the potential reasons for this discrepancy. Future research is needed to clarify the role of language similarity for beneficial effects of a multi-modal learning setting.

Keywords: foreign language pedagogy, vocabulary learning, sensorimotor-enrichment, multimodal stimulus
Presentation type: Oral presentation / Talk
Session: Language

Does the alerting-congruency interaction depend on a spatial task goal?

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Why phasic alerting increases congruency effects in conflict tasks is a matter of debate. A key question in this debate concerns the role of spatial information processing as a linking factor between alerting and cognitive control. Specifically, it has been proposed that the alerting-congruency interaction may arise only when the target or the task goal conveys spatial information. In this experiment, I tested the idea of a dependency on a spatial task goal. To this end, I used a flanker task in which the target was a left-/right-oriented triangle in one of two colours that was surrounded by flankers of the same or the opposite orientation (orientation-congruent vs. -incongruent) and having the same or the other colour (colour-congruent vs. -incongruent). To vary the nature of the task goal, I let participants respond to the target's orientation in one half of the experiment (spatial task goal), and to its colour in the other half (non-spatial task goal). To induce phasic alertness, I presented an alerting signal (AS) in half of the trials. As expected, participants ($N = 31$) responded faster in congruent than in incongruent trials, and this effect was larger in trials with an AS. Crucially, this alerting-congruency interaction was observed irrespective of whether the task goal was spatial or non-spatial, which suggests that it does not depend on a spatial task goal to emerge. Instead, the alerting-congruency interaction may depend on a target conveying spatial information or the potential of a task to induce direct stimulus-response associations.

Keywords: alerting, selective attention, flanker task, response conflict, congruency effect
Presentation type: Poster Presentation
Session: Attention

Systematic Biases in Mean Estimation of Mixed Sequences with Positive and Negative Numbers

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When we compare the best offers in two discounters or keep track of our personal best times in sports, we have to integrate information that we encounter sequentially. In this study, we investigated underlying cognitive processes leading to systematic biases in the perception and integration of sequentially presented numerical information.
Previous research has shown a tendency for participants to underestimate the mean of sequentially presented number sequences, which can be attributed to a compressed representation of numerical magnitudes (Compressed Mental Number Line, CMNL). In the first experiment, we show that the assumption of a CMNL also holds in the domain of negative numbers: As predicted by the CMNL, participants underestimated the absolute mean of sequences containing negative numbers. Interestingly, these findings only hold for purely positive or purely negative sequences. For sequences that included both positive and negative numbers the pattern reverses: Participants overestimated the mean of sequences with positive means as well as overestimated the absolute mean of sequences with negative means. In a follow-up experiment, we tested possible explanations for this effect. Specifically, we investigated memory biases in mixed sequences compared to only positive sequences using a memory recall task in addition to the mean estimation task. We discuss how the appearance of a second category (negative and positive numbers) affects the underlying processes of number integration compared to purely positive sequences.

Keywords: decision-making, Decision-from-Experience, number perception, negative numbers, mean estimation
Presentation type: Oral presentation / Talk
Session: Numerical Cognition / Crossmodal Perception

Combining cognitive modeling and eye movements to study exemplar retrieval in multiple-cue judgments

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This work combines model-based and process-tracing analyses to investigate exemplar retrieval in numeric judgments from multiple cues. Specifically, we test whether the reliance on exemplars indicated by cognitive modeling is reflected in the gaze proportions to the exemplar locations on the screen. We conducted two eye tracking studies (*N*s = 19 and 49), in which participants judged the criterion value of objects with two multi-valued features, related to the criterion in an additive (Study 1) or multiplicative (Study 2) way. Participants first learned the criterion values and locations of four exemplars, each presented in a different corner of the screen, and then judged the criterion value of new, briefly presented transfer stimuli, varying in their similarity to the exemplars. To test the exemplar retrieval during transfer, eye tracking measured the gaze proportion to the now empty screen corners (looking-at-nothing behavior), and cognitive modeling using the RulEx-J framework modeled the reliance on exemplars. Consistent with previous research, cognitive modeling and eye tracking suggest more exemplar retrieval in the multiplicative than in the additive task. Focussing on the multiplicative task, we found that participants relying more on exemplars also look more to the exemplar locations ($r = 0.36$, $p = .01$). Within-trial analyses further showed that these participants look in particular at exemplars similar to the transfer stimulus. By making use of the close link between cognitive modeling and eye tracking, our results provide new insights into the nature of exemplar retrieval in inferences from multiple cues.

Keywords: cognitive modeling, eye tracking, exemplar, similarity, memory, judgment and decision making
Presentation type: Oral presentation / Talk
Session: Computational modeling in experimental psychology: Linking model-based and processtracing analyses

The uncanny side of AI: cognitive biases in perception of ChatGPT's theory-of-mind abilities

Tobias Senger, Anna Kuhlen
RWTH Aachen University

Our perception of an artificial intelligence's (AI) social abilities significantly impacts our interactions with these systems. Here we investigate whether people attribute Theory-of-Mind (ToM) abilities to ChatGPT, and when ChatGPT's ToM ability is considered creepy. Using the Mind-Perception Hypothesis and the Uncanny Valley phenomenon, we explore biases in human perception of ChatGPT's abilities. In an online study, 28 participants (62% female) rated written responses to scenarios assessing ToM reasoning from the Adult Theory of Mind Test (A-ToM). Responses of high and medium ToM abilities were generated by ChatGPT according to the A-ToM scoring system, and were presented as either human or ChatGPT-generated. We tested whether perceived ToM abilities and perceived creepiness varied based on the assumed authorship (Human vs. ChatGPT) and A-ToM level (Low vs. High). Preliminary results show that people attribute higher ToM abilities to ChatGPT when responses demonstrate a profound understanding of social scenarios (high A-ToM level), compared to responses with a low A-ToM level. Yet, the same responses were rated as equally competent, regardless of ToM ability, when attributed to a human. Consistent with the Mind-Perception Hypothesis, ChatGPT abilities were perceived as more creepy when responses indicated high ToM abilities, compared to both ChatGPT responses with low ToM ability, and to supposedly human responses, regardless of ToM ability. Negative attitudes towards AI had no direct influence on response ratings, but interacted with attributed authorship in perceived creepiness. Our findings suggest that humans are more critical when assessing ChatGPT's skills compared to when assessing those of a human.

Keywords:
Presentation type: Poster Presentation
Session: Human Factors I

Retrieval Practice as the Foundation for Predictive Modeling: Tracking Task-Critical Vocabulary in a 64-week Language Course

Florian Sense
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In this presentation, we explore the development and deployment of a web-based flashcard application, designed for the Defense Language Institute's intensive 64-week language course for Modern Standard Arabic. The primary objective of this application is to facilitate efficient acquisition and retention of over 2,500 task-critical vocabulary terms using retrieval practice, a proven method for enhancing long-term memory retention.
The application balances the introduction of new vocabulary with refreshing previously learned words, ensuring continual progress without the loss of past learning. This dynamic balance is crucial given the extensive duration and scope of the course. The end goal of this project is to create a personalized, predictive model that adapts to each student's learning trajectory, offering tailored rehearsal items based on their current knowledge and skill level. The model will also communicate actionable insights back to students so they can make effective study choices.
However, at the inception of this project, a significant challenge was the lack of digitized, actionable data to build such a model. Thus, the flashcard application serves two functions: an effective educational tool and a means to gather essential data. This data collection is instrumental for the development of sophisticated predictive modeling capabilities in future iterations of the application.
Our talk will delve into the application's design, the methodologies employed for effective vocabulary retention, and the roadmap for future development. We will focus on preliminary findings and insights gained, setting the stage for future advancements in educational technology and personalized learning.

Keywords: Retrieval practice, predictive modeling, language acquisition, educational technology
Presentation type: Oral presentation / Talk
Session: Adaptive Retrieval Practice and its Applications in Education and Health

The evaluation of third-party punishment depending on its type, severity, and interpersonal hierarchy

Olivia Seubert, Anne Böckler-Raettig
University of Würzburg

Third-party punishment is regarded as an altruistic act, as it helps foster cooperation, trust, and fairness in social groups. However, punishment can also indicate anger and potential threat, and recent studies highlighted the ambiguity of punishment as a signal of cooperative intent. We aimed to go beyond the highly abstract and decontextualized settings typically employed in economic games to better understand how punishment and punishers are perceived in interdependent real-world situations.
Therefore, we created and validated 24 written everyday-life-scenarios and, in each of them, manipulated the type of transgression/punishment between perpetrator and victim/punisher (corporal, psychological, property-oriented; Experiment 1), the severity of punishment (weak, strong; Experiment 2) and the hierarchy between punisher and perpetrator (punisher higher or equal in rank; Experiment 3). After each scenario, participants rated the punishment's adequacy and the punisher's warmth, competence, and suitability as an interaction partner, whether as a friend or team leader. Results indicated the preference of punishments aligned with the type of transgression, weaker punishments, and punishers equal in rank to the perpetrator. Across all experiments, third parties engaging in psychological punishment were preferred and preferentially chosen as potential interaction partners. Our findings support the notion that punishment is a delicate issue, and reveal interpersonal and contextual factors that contribute to its evaluation as a useful strategy.

Keywords: Third-party punishment, prosocial behavior, real-world scenarios, interdependency, person perception
Presentation type: Poster Presentation
Session: Interaction and Social Psychology

Can cognitive calculators compute correctly? Anchoring bias in mental arithmetic

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Several studies reported systematic and operation-specific errors in adults' mental arithmetic, such as overestimation of addition and underestimation of subtraction outcomes (reviews in Mioni et al., 2021; Shaki et al., 2018). We argue that this pattern reverses true calculation signatures because encoding- and response-related errors distorted proper assessment. Here we use symbolic multi-digit stimuli and responses to avoid such peripheral error induction. We control result sizes and, for the first time, manipulate operand position through calculation instructions (e.g., "29+19" vs. "Add 19 to 29"). Across two experiments with either auditory operands (N=30) or visual operands (N=30), we identify arithmetic anchoring bias in both addition and subtraction: The larger of two operands induces calculation errors independent of its position, generating overestimation of subtraction and underestimation of addition. Our finding with task-relevant anchors extends the well-known anchoring bias into the domain of mental arithmetic and eliminates several competing theories about the origin of mental calculation biases.

References:
Mioni, G., Fischer, M. H., & Shaki, S. (2021). Heuristics and biases in the mental manipulation of magnitudes: Evidence from length and time production. Quarterly Journal of Experimental Psychology, http://dx.doi.org/10.1177/1747021820967663
Shaki, S., Pinhas, M., & Fischer, M. H. (2018). Heuristics and biases in mental arithmetic: Revisiting and reversing operational momentum. Thinking & Reasoning, 24(2), 138-156. http://dx.doi.org/10.1080/13546783.2017.1348987

Keywords: Mental arithmetic; Anchoring bias; mental calculation biases
Presentation type: Poster Presentation
Session: Metacognition

Optimal methods for learning foreign-language vocabulary: An international research competition.

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Various techniques such as spacing, retrieval practice, and the use of mnemonic strategies have each been shown to be effective at optimising learning under laboratory conditions, typically when employed on their own. How well do these techniques work in the real world, and what happens when several techniques are combined? Learners acquiring the vocabulary of a foreign language have a limited time budget and hence effective learning methods must adopt an optimal trade-off between the value of a technique and the time taken to implement it. We conducted a two-stage competition in which international research teams developed methods to maximize the number of correct translations that learners could acquire in 1 h and successfully recall 1 week later. In Stage 1, the teams tested their method for learning Lithuanian-English words pairs against a standardized control method. Five shortlisted methods and the control condition were then compared on a common online platform in Stage 2, using Lakota-English pairs, with retention data collected from over 6000 users of an online learning tool. After exclusions, the final sample was 3803. Retention declined with age and was higher in females, and participants showed some metacognitive insight into the durability of their learning. The winning entry, which combined a visual mnemonic technique with retrieval practice and an adaptive algorithm for introducing new words, achieved an average of 27.23, 95% CI [26.08, 28.38] word pairs recalled. This work highlights the importance of retrieval practice in real-world learning.

Keywords: memory, testing effect, spacing, competition
Presentation type: Oral presentation / Talk
Session: Test-enhanced learning

Effect of irrelevant information on reaction preparation in the lane change task: age-related differences

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Reaction preparation helps to anticipate upcoming reactions while driving, which is crucial for the lane change task (LCT) as it allows the steering manoeuvre to be performed faster and more accurately. Preparatory information shortens the RT and changes the dynamics of the steering manoeuvre. However, additional irrelevant information can significantly influence the preparation phase. In the current study, the influence of salient (irrelevant) additional information on younger and older drivers during lane changes was investigated. The main factors investigated in the current study were,u the occurrence of the additional information before the cue or before the reaction signal and the congruence of the additional information (compatible or incompatible with the direction of the lane change). Consistent with previous findings on LCT performance research, preparatory information reduced RT in drivers of both age groups and influenced the speed profile of the steering wheel angle. In the current study, the steering speed profile shortened especially at the beginning of the steering manoeuvre. Congruent (incongruent) additional information caused RT facilitations (increases), whereby the congruence effect with regard to the cue was lower than with regard to the reaction signal. Older participants generally showed longer RTs, higher congruency effects and a lower effect on the speed profile. The results suggest that preparation processes are strongly influenced by irrelevant information before the target than before the cue and this effect was more pronounced among older participants. Implications for advanced driver assistance systems will be discussed.

Keywords: Reaction Time, Lane Change Task, Steering Movements, Response preparation, Additional information
Presentation type: Poster Presentation
Session: Cognitive Control and Conflict I

Independent sequence learning in the motor and visual domain

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Sequence learning in the motor domain to date has only been demonstrated in combination with visual learning. The present study sought to isolate motor and visual sequence learning.

To this end, the response time (RT) in a button-pressing task was measured. A coloured circle in the screen center served as the target, and four coloured arcs around it mapped colour to four buttons' locations. The arcs' colours were changeable to uncouple the visual and the motor sequence. In the visual learning condition, target colours were sequential, while response buttons were random, and vice versa in the motor condition. Sequential lists were used for the training blocks, and randomized lists were used to measure baseline performance. Participants (n=30, mean age=24.2, 12 male) were randomly assigned to two groups: V1M2 (visual first day, motor second day) or M1V2 (motor first day, visual second day).

A mixed 2 (block: sequential vs random) * 2 (condition: visual vs motor) * 2 (group: V1M2 vs M1V2) ANOVA for the RT showed a main effect of the block, $F(1,28)=32.333$, $p<.001$, $\eta_p^2=0.536$. Sequential RT was shorter (561 ms) than random RT (571 ms), indicating that sequence learning occurred. There were no interactions of block*condition, $F(1,28)=0.020$, $p=.888$, $\eta_p^2=0.001$, or of block*condition*group, $F(1,28)=0.241$, $p=.627$, $\eta_p^2=0.009$, indicating that sequence learning did not differ between the visual and motor condition or between groups. More importantly, these results show that sequence learning in the motor domain can occur completely independent of visual learning.

Keywords: Sequence learning, Motor learning, Visual learning
Presentation type: Poster Presentation
Session: Memory and Learning III

Evaluation of news headlines in real-time: An experimental study of the effect of time pressure on perception of AI-generated misinformation

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Previous research on the perception of misinformation, or "fake news", has usually been conducted in a one-time laboratory or online study where the news was prepared in advance. In the current study, however, the perception of misinformation will be investigated using a combination of experimental and experience sampling methods, in which participants evaluate real-time news on their smartphones throughout the day. We hypothesize that under time pressure, misinformation will be rated as more accurate than without time pressure. In addition, the situational context, such as a high level of distraction, may increase the belief in misinformation. To deliver real-time news, we have developed a mobile application. The messages are randomly assigned to either the "true" or "false" condition. In the true condition, the information is streamed from an official news channel. In the false condition, an original message is modified by a ChatGPT algorithm to contain false information. In the current study, we aim to replicate the finding that time pressure increases belief in false news and to extend previous research by examining the influence of situational variables. The results will be discussed at the conference.

Keywords: fake news, misinformation, experience sampling method, experiment, time pressure, artificial intelligence
Presentation type: Oral presentation / Talk
Session: Misinformation

Is Temporal Binding in the Libet-Clock Task Related to Spatial Working Memory? A Dual Task Approach

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Temporal binding, the attraction of an action and its consequences in temporal perception, has been associated with the sense of agency.
Temporal binding often is quantified with the Libet-Clock during which participants press a button to trigger a tone while observing a clock hand rotate. Subsequently, participants report the perceived hand position during the button press or during the tone. These judgements of the so-called contingent conditions are compared to baseline conditions in which only one, the button press or the tone, occur.
The aim of this study is to investigate a possible mechanism underlying this effect. The contingent conditions present two pieces of spatial information, the clock hand positions during button press and tone. One possible mechanism could be pro- and retrospective interference between in spatial working memory between the two hand positions. From this assumption we derive the hypothesis that temporal binding increases under spatial working memory load.
75 participants completed the Libet-Clock task twice. Once, every trial is preceded by an array of nine squares of which zero to four change their color. In the other instance, zero to four Chinese characters are presented before every trial. After each trial, the presented information had to be recalled.
Bayes factors for linear model comparison revealed the temporal binding effect which, however, did not depend on the number of items to be remembered in neither of the two dual tasks. These results suggest that the temporal binding effect does not result from interference processes within the spatial working memory.

Keywords: Temporal Binding, Working Memory, Sense of Agency, Libet-Clock
Presentation type: Poster Presentation
Session: Memory and Learning II

The “bilingual advantage” in Word learning: A meta-analysis

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The existence of a bilingual advantage (i.e., better performance for bilingual than monolingual participants on a specific measure) has been hugely debated, with a majority of recent studies questioning its existence. For word learning, a bilingual advantage was observed multiple times with different types of bilinguals (e.g., balanced and unbalanced) and different paradigms (e.g., cross-situational statistical learning and paired-associated learning). However, not all studies found a bilingual advantage, and existing meta-analyses on the bilingual advantage often do not include word learning studies. As a result, it is not clear whether, and if so, how bilingualism may impact word learning. In this meta-analysis, we, therefore, aim to understand the presence and strength of the bilingual advantage in word learning by collecting all the existing literature (systematic review) and performing some quantitative analyses on the effect sizes (meta-analysis). We will search five databases for peer-reviewed journal articles and proceedings. We will report participants’ demographics, especially language-related characteristics (e.g., language combination and proficiency), sample sizes and specifics of the word learning paradigm (e.g., how novel word stimuli were created). We will then perform a main analysis comparing monolinguals' and bilinguals' word learning performance (measured as accuracy). Finally, we will (if possible) perform sub-analyses to see if the strength of any observed bilingual advantage differs across age groups and/or word learning paradigms.
Keywords: language, bilingualism, learning, word learning, meta-analysis
Presentation type: Oral presentation / Talk
Session: The Impact of Language Experience on Learning and Memory

Beyond binary bindings: Evidence for multi-feature distractor-response bindings

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Binding theories postulate short-term associations between stimulus and response features, which are stored in temporary episodic traces called event files. If any of the features in an event file is repeated, the entire event file, including the response, is retrieved, thus influencing future responding. In general, these short-term bindings have often been observed to be binary in nature, that is, bindings between two features, but not more. In the present study, evidence for more complex bindings was tested with auditory distractor stimuli. Participants responded to a coloured geometric form, while simultaneously being presented with the irrelevant sound of musical instruments in either a high or low frequency. The results indicated a significant higher-order interaction between the response, musical instrument, and tone frequency. In order to exclude the alternative explanation that the unique timbre of the musical instrument was responsible for the interaction, a second study using tone frequency and tone length as distractors was conducted. Preliminary results indicate, once again, a significant higher-order interaction. These results are discussed in the context of binding structures within event files.
Keywords: action control, stimulus-response bindings, distractor-response bindings
Presentation type: Oral presentation / Talk
Session: Episodic Binding

Predicting the Success of Replication Based on Validity Indicators

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Despite the importance of reliable results, replication rates have been unexpectedly low. For almost a decade, methodologists have been working to explain these low rates and understand the factors that contribute to reliable results. One notable study conducted by Altmejd et al. (2019) used a machine-learning model to predict replication success. They considered statistical indicators, such as p-values, as well as non-theoretical indicators like the number of authors. We expand upon their findings by incorporating theory-driven predictors from the four validities-framework (Fabrigar et al., 2020) that closely relate to the design of experimental research. For internal validity, we consider, for example, attrition rates. For external validity, we include, for example, differences in sample characteristics. For construct validity, we include, for example, the extent of validation for the measures used. Lastly, for statistical conclusion validity we include experimental design factors such as the use of within- or between subjects manipulations. Our goal is to provide a more comprehensive understanding of the factors that are associated with replication success, which may ultimately enhance the reliability of empirical research.

Altmejd, A., Dreber, A., Forsell, E., Huber, J., Imai, T., Johannesson, M., Kirchler, M., Nave, G., & Camerer, C. (2019). Predicting the replicability of social science lab experiments. PLoS ONE, 14(12), 1–18. https://doi.org/10.1371/journal.pone.0225826
Fabrigar, L. R., Wegener, D. T., & Petty, R. E. (2020). A validity-based framework for understanding replication in psychology. Personality and Social Psychology Review, 24(4), 316–344. https://doi.org/10.1177/1088868320931366

Keywords: Replication; Methodology; Research Design
Presentation type: Poster Presentation
Session: Methods

Interindividual Differences in Dopamine Effects on Temporal Discounting

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Changes in impulsive choice occur in numerous psychiatric disorders. For example, individuals suffering from substance use disorders and problem gambling show increased discounting of future rewards (Bickel et al., 2014; Ring et al., 2022). Maladaptive alterations in dopaminergic circuits are assumed as functional correlates of such effects (Volkow et al., 2004). In line with these findings, pharmacological manipulation of dopaminergic neurotransmission modulates decision making. Enhancing dopamine signalling has been reported to increase (Pine et al., 2010) and reduce impulsive choice operationalised as temporal discounting (de Wit et al., 2002), while some studies reported no overall effect of modulating dopamine signalling on impulsive choice (Petzold et al., 2019). The variability suggests that manipulating dopamine neurotransmission may have contrary effects in different individuals, possibly related to baseline differences in dopamine function (Cools & D'Esposito, 2011).

We studied the effects of manipulating dopaminergic transmission on the discounting of future rewards and assessed a possible interaction with putative proxies of dopamine function. Following a randomised, double-blind placebo-controlled design (see preregistration at https://osf.io/a4k9j/), 76 healthy men and women performed an intertemporal choice task with two magnitude conditions under 150 mg L-DOPA and placebo, respectively. To describe the devaluation of future rewards we took a model-based approach of hyperbolic discounting and modelled the decision process with drift diffusion models via linear and non-linear linkage functions. We further assessed spontaneous eye blink rate, working memory capacity, and impulsivity as putative proxies of baseline dopamine function.

Replicating previous findings (Smith & Peters, 2022), we found a magnitude effect, meaning that higher rewards are discounted less. Model comparison showed that the choices and response times were best accounted for by a non-linear drift rate mapping. Crucially, L-DOPA reduced discounting, challenging the results from Pine et al. (2010) by using a substantially larger sample. The results are more in line with the idea that increases in dopamine transmission attenuate temporal discounting (Wagner et al. 2020). However, we found no evidence that the drug effects were modulated by the putative dopamine proxies. While these measures may reliably reflect interindividual differences, using them as proxy measures for baseline dopamine function should be reconsidered.

Keywords: dopamine, decision making, drift diffusion model, intertemporal choice, impulsivity
Presentation type: Oral presentation / Talk
Session: Modulation of Impulsive Choice and Impulsive Action

A comparison of unisensory and multisensory landmark distortions on tactile target localization

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The localization of targets is influenced by the presence of an additional non-target stimuli, referred to as landmarks. In both the tactile and visual modality, systematic distortions of target localizations elicited by the landmark have been observed, often resulting in a shift towards the landmark. Importantly, previous studies have focused on unisensory presentations of landmark and target. However, everyday experiences often involve the integration of information from multiple sources. Given that information from multiple senses can be integrated to enhance performance in perception tasks, it is hypothesized that a multisensory presentation of landmark and target might improve the performance in a target localization task as well. Therefore, landmark distortions should be reduced in a multisensory compared to a unisensory set-up. In two experiments (each N = 30), tactile or visual targets were presented along with tactile or visual landmarks. Importantly, both experiments showed that tactile targets were less distorted by visual landmarks compared to tactile landmarks. Interestingly, for visual targets, no difference was observed between landmarks from the same or different modalities. These findings underscore that the integration of information from other senses supports tactile perception and suggest that the multisensory integration benefit might be more pronounced for touch than vision.

Keywords: landmark, tactile localization, spatial distortion, multisensory
Presentation type: Oral presentation / Talk
Session: Touch perception: From Unisensory to Multimodal

Thinking about intentions and fulfilling them: A daily-life experience sampling study

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In our day-to-day lives, our spontaneous thoughts often center around significant concerns or goals we have yet to accomplish. Research utilizing time-based prospective memory tasks suggests that these thoughts can act as cues to perform specific actions at designated times such as calling the experimenter at a later time. However, many of our everyday intentions involve tasks needing completion before a deadline rather than at an exact moment, such as submitting a conference abstract.
We hypothesized that in such cases, intention-related thoughts might not only increase the overall likelihood of fulfilling intentions but also 1) reduce the delay between intention formation and fulfillment and 2) accelerate their completion. To investigate these possibilities, we gave 105 participants the task to read a 14,300-word expository text and answer comprehension questions online within five days. Throughout this period, we periodically sampled participants' intention-related thoughts using their mobile phones, collecting around 10-12 samples per day.
As a result, the more frequently participants thought about the reading task, the earlier they started reading. Additionally, those who thought more about the task after initiating it tended to finish the task earlier. Additional analyses of thought characteristics (i.e. valance and activation) and activities while experiencing intention-related thoughts like complexity and perceived importance are discussed.
Keywords: Intentions, Mind Wandering, Prospective Memory, Procrastination, Experience Sampling
Presentation type: Poster Presentation
Session: Memory and Learning I

Embodied Cognition: How Placing the Hands Near a Stimulus Alters Conflict Processing in Auditory Modalities

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Variations in stimulus-hand proximity have been shown to alter conflict processing. A stimulus-response (S-R) conflict, for example, was increased when response hands were placed close (proximal) compared to far (distal) from the stimulus in both, visuo- as well as auditory-motor Simon tasks. Conversely, a stimulus-stimulus (S-S) conflict in a classical visual Stroop paradigm was reduced in a proximal compared to a distal stimulus-hand condition. This suggests that stimulus-hand proximity might affect S-S and S-R conflict resolution processes differently. At the same time, it needs to be determined, whether a proximal stimulus-hand condition also reduces the Stroop conflict in an auditory domain where the task-irrelevant information requires pure semantic processing without any reading process. The present study investigated the influence of stimulus-hand proximity on S-S and S-R conflict processing in an auditory gender-categorization Stroop (Experiment 1a and 1b) and Simon task (Experiment 2). Applying the same stimulus materials in all experiments, Experiment 1a and 1b consistently demonstrated that the auditory Stroop effect was unaffected by stimulus-hand proximity, which raises the question to which extent stimulus-hand nearness in previous demonstrations of reduced visual Stroop effects impacted semantic or rather reading processes. In Experiment 2 the auditory Simon effect was significantly increased when the hands were placed near the stimuli, suggesting heightened integration of task-irrelevant spatial stimulus features. These findings highlight that response hands near visual and auditory stimuli heighten spatial feature processing rather than semantic processing.

Keywords: Hand-nearness effect, Hand-stimulus proximity, Auditory Simon effect, Auditory Stroop effect
Presentation type: Oral presentation / Talk
Session: Embodied Cognition

Beliefs about autobiographical memory in Denmark

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Conversations with vulnerable groups such as children, who are victims of abuse, are to a large extent dependent on the beliefs of the person, who is making conversation with the children. Previous studies have looked at different profession groups such as psychologists, and their beliefs about memory. Data indicate that beliefs about some specific topics about memory do not reflect the current scientific knowledge (e.g., Bjørndal et al., 2020; Magnussen & Melinder, 2015; Melinder & Magnussen, 2013). However, only few of such studies (e.g., Kostopoulos et al., 2019) have tailored these questionnaires to ask directly about beliefs about children's performance. In a survey we have mapped out what different profession groups believe about children's ability to talk about and remember events.
I will present the results from 3 of our groups, namely the police (n = 64), psychologists (n =70), and social workers (n = 50). To our knowledge this is the first systematic investigation and comparison of beliefs about memory in Denmark. This knowledge will provide important insights regarding where an update of the knowledge base is warranted to reflect the current scientific stand and highlight where the current knowledge base is sufficient as is. While results are being analyzed at the moment of submitting this abstract, data will be ready before the conference. As in similar studies, we expect the profession groups to possess state-of-the-art knowledge in some areas, while other areas are expected to need an update in order to live up to the current scientific status.
Keywords: beliefs, autobiographical memory, children
Presentation type: Oral presentation / Talk
Session: Retrieval processes in autobiographical remembering

What can a Theory of Visual Attention reveal about how expertise influence perception?

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A Theory of Visual Attention (TVA) can be utilised to isolate specific attentional parameters. While these can reveal particular mechnisms of attention, they may also provide an insight into phenomena that may rely on similar basic mechanisms.
While short-term memory capacity classically have been seen as a set limitation (e.g., Luck & Vogel, 1997), then we have previously demonstrated that short-term memory capacity can be modulated by the degree of familiarity (see Sørensen & Kyllingsbæk, 2012). In fact, for an expert observer familiarity seem to be the main factor affecting processing and attentianal selection, with an increase in C and K, while leaving t_0 unaffected (Dall, et al., 2021).
Interestingly, we see similar modulations of individual TVA paramenters in people with colour-grapheme synaesthesia (Ásgeirsson, Nordfang, & Sørensen, 2015) providing supporting evidence to the notion that synaesthesia may be linked to learning and expertise.
There are several different accounts for how synaesthesia may be established, for example through an abnormal pruning process during brain maturation (see Zelazny & Sørensen, 2022). However, a less popular idea is that synaesthesia is linked to learning and expertise. We have suggested that colour-grapheme synaesthesia may establish as a response to learning abstract categories like the alphabeth (Mannix & Sørensen, 2021), and a such provide a benificial strategy for the observer. While a direct link is difficult to demonstrate, TVA provide suporting evidence for the learning hypothesis of synaesthesia.

Keywords: TVA, Short-term Memory, Synaesthesia, Attention, Learning, Familiarity
Presentation type: Oral presentation / Talk
Session: Progress in TVA-based Visual Attention Research: From Fundamentals to Applications I

The Role of Cognitive Load in the Emotional Effect on Associative Memory

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Previous studies suggest divergent effects of emotions on memory functions: impairing associative memory while enhancing item memory (e.g. Bisby & Burgess, 2014; Bisby et al., 2018). Working memory is considered a potential mechanism underlying the impairing effect of emotion. On one hand, arousal is claimed to hinder working memory, complicating the association of emotional and neutral stimuli. On the other hand, it is suggested that unique features of emotional stimuli may elicit diverse brain activations, potentially reducing working memory performance. The question is whether emotional disruption of associative memory arises from its impact on working memory or from shared activation with other brain regions, like visual areas, impeding working memory activation during emotional stimulus association. This study addresses this question by manipulating working memory performance under high and low cognitive load conditions. Participants encoded pairs of neutral (neutral scene-neutral object) and emotional (emotional scene-neutral object) stimuli, and then solved either easy or difficult math problems after each trial. Subsequently, they underwent an associative memory test immediately or 24 hours later. If the first suggestion is valid, emotional stimuli should show no retention interval effect. If the second suggestion is valid, increased working memory activation would enhance associative memory. The results demonstrated that high cognitive load improved immediate associative memory performance for neutral pairs and delayed performance for emotional pairs. In conclusion, boosting working memory enhanced associative memory. This effect persisted over time for emotional pairs but diminished for neutral pairs. Results supported the second suggestion over the first.

Keywords: Associative memory, emotion, cognitive load
Presentation type: Oral presentation / Talk
Session: Working Memory

Embodied cognition in native and foreign language

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This study systematically investigates embodied cognition effects in written language production, specifically exploring whether effects previously documented in native languages (L1) can also be observed in non-native languages (L2). Especially regarding their different manners of acquisition, the question whether languages acquired later in life can exhibit similar sensorimotor grounding like native languages is of particular interest. The focus of the present study was on the phenomenon of manual action verbs. Prior research has demonstrated that verbs denoting manual actions (such as 'press', 'hold' or 'clap') can elicit both interference or facilitation in concurrently performed manual actions (such as writing or typing a word). Administering a typing task, our objective was to assess performance differences in motor planning, motor execution and accuracy, influenced by semantic word and sentence features. While Experiment 1 involved native speakers, Experiment 2 engaged speakers for whom the experimental target language was foreign. In essence, we observed interference effects for manual action verbs (and to a certain extent also for non-manual action verbs) relative to non-action verbs in both speaker groups (native and non-native speakers). Results of an additional sentence negation task were less clear, but still raised important questions and methodological concerns for future research.
Most notably, similar patterns emerged in both samples, suggesting similar processing mechanisms for native and foreign language speakers and sensorimotor grounding also in L2. Hence, embodied language effects may also arise in foreign languages. Related findings and theories, implications for future research as well as open questions will be discussed.
Keywords: native language; foreign language; L2; embodied cognition; manual action verbs, negation, typing
Presentation type: Oral presentation / Talk
Session: Embodied Cognition

Explaining Boomerang Effects in Persuasive Health Communication: Psychological Reactance to Healthy Eating Messages Elevates Attention to Unhealthy Food

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While psychological reactance is often invoked to explain the unintended boomerang effects of persuasive health messages, underlying processes that might explain how reactance affects behavior are rarely studied. We investigated whether messages that elicit reactance can bias attention by increasing the perception of information that potentially facilitates adverse behavior. Participants ($N = 998$) were assigned to one of three experimental conditions: reading an aggressive and emotional text asking them to stop eating meat (appeal condition); reading a neutral text about the nativeness and benefits of eating less meat (information condition); or completing an unrelated word count task (control condition). After assessing their reactance, participants were asked to identify as many words as possible in a word grid in which some words related to meat. Compared to the other conditions, the appeal condition elicited the greatest reactance. Furthermore, omnivore participants in this condition identified significantly more meat-related words when they reported higher levels of reactance. By showing that psychological reactance elicited by forceful health appeals increases attention to information that may facilitate the admonished behaviors, our findings contribute to an improved understanding of effective health communication.

Keywords: psychological reactance, attention, meat consumption
Presentation type: Poster Presentation
Session: Human Factors I

The relationship between visual short-term memory and CERAD results in patients with amnestic mild cognitive impairment

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Patients with amnestic Mild Cognitive Impairment (aMCI) who are at risk for further cognitive decline and development of Alzheimer's dementia show deficits in visual attention. In the present study, we evaluated whether parameters of visual attention, estimated based on theory of visual attention (TVA; Bundesen, 1990) explain variance of performance in a standard battery assessing cognitive functions in patients at risk for dementia. More precisely, we assessed whether visual short-term memory (vSTM) capacity and visual processing speed are significant factors in regression models including group (aMCI vs. healthy controls) with total and composite scores derived from the Consortium to Establish a Registry for Alzheimer's Disease (CERAD+).

When comparing aMCI patients to a sociodemographically matched healthy control group, we found significant impairments in visual processing speed and vSTM capacity. Furthermore, vSTM capacity, but not visual processing speed, significantly contributed to standard task performance. Apart from group and age, it significantly predicted variance in the total as well as in the memory and the executive functions composite scores of the CERAD.

These results indicate that the reduction in vSTM capacity is an early indicator of cognitive decline in patients at risk for Alzheimer's disease and significantly contributes to their declining performance in standard neuropsychological tasks.

Keywords: Visual Short-Term Memory, Visual Attention, aMCI
Presentation type: Oral presentation / Talk
Session: Progress in TVA-based Visual Attention Research: From Fundamentals to Applications II

Cognitive Control in Flight Missions: Balancing the Stability-Flexibility-Dilemma

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Flight missions are highly dynamic and cognitively demanding multitasking situations. Navigating a helicopter or an aircraft safely requires sophisticated cockpit task management strategies. Multiple flight instruments have to be operated simultaneously in a goal-oriented manner despite various visual and auditory distractions. Task prioritization is one example of an effective task management strategy. For this, cognitive control is highly relevant, which is also subject to the stability-flexibility dilemma. The stability-flexibility dilemma of cognitive control relates to the contradictory demands of cognitive control to enable goal-directed behaviour. On the one hand, cognitive stability is necessary to shield goals from interference. On the other hand, cognitive flexibility enables flexible task switching. While the stability-flexibility dilemma has often been studied in simple stimulus-reaction experiments, its implications in more applied settings like flight missions were less researched. To address this, three experiments were conducted. The stability-flexibility dilemma was manipulated using a reinforcing mechanism in a virtual flight environment (MATB). Participants were instructed to prioritize either a tracking task (stable condition) or no tasks (flexible condition). The respective task prioritization strategy was reinforced via a scoring mechanism. Performance and eye-tracking results underscore the profound impact of task prioritization on dynamic multitasking scenarios. Future studies should also consider a qualitative assessment of the stability-flexibility dilemma, offering insights into how pilots navigate these challenges in different flight phases.

Keywords:
Presentation type: Oral presentation / Talk
Session: Rationalizing on the Constraints and Structure of Cognitive Control – Lessons from Laboratory and Field Assessments

From Belief to Distribution: A Psychometric Study of Prior Elicitation Methods

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Before running a study, researchers and relevant domain experts such as doctors, nurses, or mechanics often have expectations about important aspects of the data that will be collected. Prior elicitation methods are structured interview methods used to transform these pre-data beliefs into probability distributions that can be used to inform Bayesian statistical models. In practice, many different prior elicitation methods have been employed, but a comprehensive psychometric evaluation of these methods is still lacking. However, employing prior elicitation techniques that do not adequately capture individual plausibility judgments can lead to misinformed models and, in the worst case, biased conclusions. In this talk, I will present a series of studies designed to compare the psychometric quality of three prior elicitation methods from the well-known SHELF framework and discuss their advantages and disadvantages for the elicitation of probability distributions.

Keywords: psychometrics; Bayesian statistics; belief elicitation; confidence; prior distribution
Presentation type: Poster Presentation
Session: Methods

Multitasking costs in triple-task performance despite dual-task training

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This study delves into the intricacies of multitasking by examining the transfer effects from dual-task to triple-task scenarios. Our research extends beyond conventional dual-task paradigms to explore the impact of triple-task performance on two participant groups: those untrained in single, dual, or triple tasks and those previously trained in single and dual tasks. Despite the initial advantage observed in the trained group, this advantage diminished throughout the sessions. Notably, both groups adopted distinct strategies for processing within the triple task, revealing the influence of task coordination on response times as the task set expanded. Our findings emphasize the significance of task coordination in multitasking scenarios, shedding light on the complexities involved in transitioning from dual to triple tasks. The study demonstrates that training can facilitate the transfer of skills acquired from specific tasks to others, with the formation of specific task sets playing a pivotal role in processing and coordination. Despite training, the persistence of multitasking costs challenges traditional assumptions about eliminating such costs through extensive practice. In conclusion, our research contributes to the current understanding of multitasking by highlighting the need for further exploration into inter(sub)task coordination and prioritization in multiple-task scenarios. The study underscores the complexities inherent in managing triple tasks and individuals' potential strategies. The findings advocate for ongoing refinement of cognitive models to accommodate the evolving nature of multitasking behaviors in real-world, complex environments.

Keywords: dual task; triple task; task set; task coordination; training
Presentation type: Oral presentation / Talk
Session: Rationalizing on the Constraints and Structure of Cognitive Control – Lessons from Laboratory and Field Assessments

Self-(m)other overlap: the enfacement illusion in middle childhood is present with a stranger but not the mother

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Multisensory integration processes are proposed to underly bodily self-representations. We aimed to test this claim in children and regarding the most central part of one's identity: the face. Furthermore, representations of the self are proposed to be not isolated but connected with the representations of close others constituting a potential top-down influence on changes of self-representations.
Therefore, we used the enfacement illusion in a sample of 64 5-6-year-old children to investigate 1) the effect of synchronicity of interpersonal multisensory stimulation (IMS) and 2) the effect of the identity of the other person on changes in self-other overlap.
In a between-within-mixed design, children were exposed to one trial with synchronous and one with asynchronous IMS – either with a stranger or the mother as other person. A self-recognition-task using morph videos of self and other and an enfacement questionnaire were implemented as dependent measures.
Results reveal in the stranger condition a significant effect of synchronicity on the self-recognition-task with a significantly smaller effect in the caregiver condition. Regarding the enfacement questionnaire, synchronicity of IMS had no effect in both conditions. However, closer exploration of the enfacement questionnaire ratings reveals an effect on single item level.
Overall, our findings suggest that the enfacement illusion in middle childhood is present with a stranger, but not the mother. While we thus find an effect of identity on the enfacement effect, its direction is contrary to our hypothesis. Therefore, the proposed closeness between mother and child did not increase changes in self-other overlap during IMS.

Keywords:
Presentation type: Oral presentation / Talk
Session: Self-Processing in the Social Mind: Insights from Behavioral and Neurocognitive Psychology

Uncovering the Olfactory Space: from different assessment methods to interpretable concept embedding models

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Olfactory perception requires mapping unique chemical information to our internal representations of objects (e.g., strawberry), categories (e.g., food), and concepts (e.g., pleasantness). However, in contrast to other sensory modalities, it is not well understood which core dimensions form our olfactory space and how to reliably discover them. Our approach to address this question is based on the organizational scheme of representations in terms of (dis)similarities.

In a first step, each of our participants (N = 8) performed three tasks with 16 different odorants to derive such dissimilarities: (1) feature rating of each odorant according to 8 features, (2) rating of pairwise dissimilarities between odorants (120 pairs) and (3) the triplet-odd-one-out task (TOOO), where participants choose out of an odorant triplet the one that differed most from the others (560 triplets). The three experiments were repeated after at least one week's break. For each task, we quantified pairwise dissimilarities from the responses to obtain representational dissimilarity matrices (RDMs). Crucially, the TOOO task revealed the most informative RDMs and the highest retest reliability out of all three tasks.

In a second step, we trained a concept embedding model on the TOOO data given that we may assess olfactory representations best with this task. The model provided interpretable and reproducible dimensions characterizing the odorants and predicted dissimilarity structures with high accuracies using only a subset of possible triplet combinations for training. Overall, our findings demonstrate the potential of AI to undersample in the TOOO and to discover the dimensionality of our olfactory space.

Keywords: olfaction, representational dissimilarity, embedding model, interpretable artificial intelligence
Presentation type: Oral presentation / Talk
Session: Cognitive and Neural Processes Underlying the Perception of Odors

Overweighting of prior knowledge during predictive language processing is associated with psychotic-like symptoms

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Background: Impaired language processing is a core symptom of psychosis and is critically involved in shaping positive (e.g., auditory hallucinations) and negative symptoms (e.g., social withdrawal). Hierarchical Bayesian accounts of psychosis suggest an imbalance in the weighting of prior beliefs and incoming sensory information to be an underlying mechanism of symptom development. Thus, the goal of this study was (1) to investigate the use of semantic prior beliefs relative to sensory information during predictive language processing as a trait marker for early psychotic-like symptoms and (2) to explore the underlying neurophysiological signatures of potential alterations.

Methods: 37 participants assessed for psychotic-like symptoms completed a predictive language paradigm while their brain activity was recorded with EEG. In the task, participants listened to sentences of varying predictability, with the sentence-final words being degraded in clarity to different degrees. They were asked to report the word they perceived to assess conditioned hallucinations. To estimate the relative strength of semantic prior beliefs over the sensory input, we applied computational modelling and investigated the neurophysiological underpinnings with EEG.

Results and conclusion: Computational modelling revealed an overweighting of prior beliefs relative to sensory information with increasing psychotic-like symptoms. On a neurophysiological level, we found that this was linked to an altered N400 effect. Interestingly, the overweighting of semantic prior beliefs was also associated with experiencing more conditioned hallucinations. In conclusion, the present findings may provide an initial mechanistic explanation of how suboptimal predictive language processing contributes to the formation of hallucinations.

Keywords: Psychosis, Language Processing, EEG, Predictive Coding, Computational Modelling
Presentation type: Oral presentation / Talk
Session: How do auditory and speech processing alterations contribute to symptoms in psychosis: a predictive coding approach

The topographic organization of diverse object properties in the human visual system

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Prior research has revealed a fundamental tripartite division of higher-level visual cortex into regions responding preferably to large objects, all animals, or small objects (Konkle & Caramazza, 2013). It has been suggested that this organization by animacy and real-world size is supported by mid-level visual curvature information (Long et al., 2018). Given the comparably small scale of the original studies, we aimed to test how these organizational principles apply to a broader, more representative set of natural images and, more generally, what other visual and semantic features could underlie the functional organization of occipitotemporal cortex. To this end, we used THINGS-fMRI (Hebart et al., 2023), featuring fMRI responses to 8,740 naturalistic images of 720 categories, and a rich behavioral dataset of object property ratings (Stoinski et al., 2023), as well as novel image-level curvature ratings. Our results confirm many facets of the characteristic animacy-size organization, but reveal a more partitioned size organization and a stronger distinction of responses to large and small animals. These findings were consistent across all subjects and robust to various modulations of our stimulus set. With respect to curvature, we observed rectilinear preferences in scene-selective regions, with interleaved curvy preferences. Nevertheless, perceived curvature alone could not explain the animacy-size division. Finally, variance partition revealed high multicollinearity of object properties, with moveability ("can move"), preciousness, and curvature explaining most unique variance. Together, our results confirm the generalizability of previous findings to representative, natural images while refining and enhancing our understanding of visual cortex organization.

Keywords: visual object recognition, fMRI, property ratings
Presentation type: Oral presentation / Talk
Session: Cognitive and Neural Processes Underlying the Perception of Actions, Scenes and Objects I

Testing Theory of Mind in GPT Models and Humans

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Interacting with other people involves reasoning about and prediction of others' mental states, or Theory of Mind. This capacity is a distinguishing feature of human cognition but recent advances in Large Language Models (LLMs) such as ChatGPT suggest that they may possess some emergent capacity for human-like Theory of Mind. Such claims merit a systematic approach to explore the limits of GPT models' emergent Theory of Mind capacity and compare it against humans. We show that while GPT models show impressive Theory of Mind-like capacity in controlled tests, there are key deviations from human performance that call into question how human-like this capacity is. Specifically, across a battery of Theory of Mind tests, we found that GPT models performed at human levels when recognising indirect requests, false beliefs, and higher-order mental states like misdirection, but were specifically impaired at recognising faux pas. Follow-up studies revealed that this was due to GPT's conservatism in drawing conclusions that humans took to be self-evident. Our results suggest that while GPT may demonstrate the competence for sophisticated mentalistic inference, its lack of embodiment within an action-oriented environment make this capacity qualitatively different from human cognition.

Keywords: theory of mind, artificial intelligence, large language models, ChatGPT, social cognition
Presentation type: Oral presentation / Talk
Session: Human Factors I

Kinematic signatures of pedagogical communication

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One of the major benefits of joint action is for learning. By learning with or from other people, we expand our latent capacity for acquiring new skills or techniques that would be otherwise difficult to innovate individually, such as driving a car, tying knots, or playing an instrument. Communicating a skill to a naive learner involves energetic and opportunity costs to the teacher, making the efficiency of pedagogical communication a high priority during learning interactions. It is an open question how teachers approach pedagogical communication when their only experience of the skill is through individual learning, and the relationship between the movements that they have learned and the pedagogical modulations they make to teach. We present a study where participants first learned a motor timing task (Individual Learning) with two timing targets—absolute and relative timing—and then produced demonstrations emphasising one of the two targets. Results show considerable heterogeneity in Individual Learning outcomes of relative timing that was associated with specific kinematic features of participants' movements. Furthermore, participants who learned this relative timing better then modulated these same kinematic parameters specifically when demonstrating the task for a new learner. Teachers recognise the task-relevant information they acquire through individual learning and strategically modulate this to communicate skills to naive learners.

Keywords: joint action, communication, social learning, teaching
Presentation type: Oral presentation / Talk
Session: Better together? Benefits and costs of joint action

CANCELLED - Generalizability of control across cognitive and emotional conflict

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Cognitive control plays a crucial role in navigating ambiguous or conflicting situations. Does control of thoughts and behavior go hand in hand with the ability to control emotions? Traditionally, the exploration of control has taken separate paths for cognitive and emotional conflicts. However, recent theoretical perspectives that are based on evidence from clinical, social, and developmental psychology, as well as neuroscience suggest a close link between processes governing emotional and cognitive control.
The main objective of our study was to investigate whether cognitive and emotional control operates within specific domains or whether control processes induced by cognitive or emotional conflict can generalize across the respective other domain.
In four Experiments, we tested how control in one domain (e.g., cognitive) interacts with control in the other domain (e.g., emotional) on a trial-by-trial basis. We devised an experimental protocol that varied the source of conflict using both, cognitive and emotional Stroop tasks, examining the Congruency Sequence Effect as an indicator of cognitive or (implicit) emotional control, respectively.
Our results revealed significant Congruency Sequence Effects across cognitive and emotional conflict tasks, suggesting an interaction of control mechanisms across domains. However, within-domain Congruency Sequence Effects were significantly larger than across-domain Congruency Sequence Effects. Therefore, we put forward a hybrid account, which posits a dual nature of control that is partly based on domain-general mechanisms and partly acts specifically for cognitive and emotional domains.

Keywords: Cognitive Conflict, Emotional Conflict, Congruency Sequence Effect, Cognitive Control, Stroop Task, Implicit Emotion Regulation
Presentation type: Oral presentation / Talk
Session: Affect, motivation and control II

Three sides of one coin? Comparing storage and retrieval of three multinomial models.

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At least three multinomial models (Batchelder & Riefer, 1980; Riefer & Batchelder, 1995; Rouder & Batchelder, 1998) have been used to separately measure storage versus retrieval processes in associative long-term memory. We are planning a within-subjects study to estimate individual storage and retrieval parameters from all three models. First, we want to study the psychometric properties of the estimates by measuring the test-retest reliability within each model. Given reliability, the next step is to understand whether the three storage parameters and the three retrieval parameters per person are related. And lastly, we are planning to include span tasks (Unsworth et al., 2005) to measure working memory capacity and correlate it to the latent long-term memory processes. We are currently trying to answer open questions about aspects of the design such as counterbalancing of the tasks and about modeling such as planning a one- or two-step analysis procedure.

Keywords: multinomial modeling, psychometrics, associative long-term memory, memory storage, memory retrieval, interindividual differences
Presentation type: No-Data Poster
Session: Memory and Learning III

How motorized vehicles overtake: Passing distances and cyclists' perceptions

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Overtaking by motorized vehicles with insufficient lateral passing distance (LPD) from cyclists can lead to near misses, causing cyclists to feel stressed. This highlights the need to consider both objective safety conditions and subjective safety perceptions.
We conducted a semi-naturalistic field study in urban mixed traffic where $N = 38$ participants cycled along two predefined routes in the city of Braunschweig, Germany, with an instrumented bicycle. For each overtaking event we measured the maintained LPD with an ultrasonic Sensor and recorded cyclists' verbal rating of their Mental Comfort. We also captured different characteristics of each event (e.g. cycling facility, speed limit, type of overtaking vehicle etc.).
For $N = 720$ overtaking events with a mean LPD of $M = 161.0$ cm ($SD = 44.8$ cm) 42.5 % of the events were below the legal required minimum LPD of 150 cm. There are no significant differences in the mean LPD between different cycling facilities. However, it can be observed that the number of close overtaking events is lowest when cycling facilities are provided with the highest mean LPD on mandatory cycle lanes.
Measuring cyclists' perceptions show that in most situations (68.7 %) Mental Comfort is at least rather good, so that they feel relatively stress-free, relaxed and safe. Depending on the LPD, cyclists' Mental Comfort is quite poor for close overtaking. So, the initial results show first indications that LPD is a crucial parameter for cyclists' Mental Comfort.
Keywords: overtaking, lateral passing distances, drivers' behaviour, cyclists' perception, mental comfort, field study
Presentation type: Oral presentation / Talk
Session: Traffic Psychology I: Human behavior and traffic safety

Exploring the Interplay of Curiosity, Time, and Cognitive Effort in Information Seeking

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Previous research showed that if information is considered relatively unimportant, curiosity follows an inverted U-shaped function of people's confidence ratings in knowledge about this information. However, if information is considered important, the relationship between curiosity and confidence is modulated and changes to a negative correlation (Spitzer et al., 2023). Furthermore, research has found that high curiosity increases people's willingness to invest time to access information. However, it remains unknown if people also decide to invest cognitive effort to access information. Here, we applied the curiosity paradigm introduced by Kang et al. (2009) to (i) replicate the relationship between curiosity, confidence, and perceived information importance and (ii) investigate whether participants would decide to respond to a set of random-dot kinematograms if they are curious to access information. We replicated previous findings on how information importance modulates the relationship between curiosity and confidence. We also found that participants decided to respond to random-dot kinematograms if they indicated to be curious about information. In addition to strengthening previous findings about information importance, our results suggest that individuals invest cognitive effort, in addition to time, if they are curious to access information.

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Keywords: curiosity, cognitive effort, random-dot kinematogram task, information seeking
Presentation type: Oral presentation / Talk
Session: Cognitive Effort

Pre-empting the cue or always ready to switch? Distinguishing between theories of the switch probability effect on auditory attention switch costs.

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Our recent research has shown that preparing to listen to a different voice in a 'cocktail party' reduces the attention "switch cost", but only if the probability of a relevant voice switch is relatively low. The current study investigates whether this effect of switch probability on the switch cost is due to "phasic" reconfiguration initiated before the target voice is specified when a switch is likely (pre-cue reconfiguration, e.g. Monsell & Mizon, 2006). To examine this, we employed the voice switching paradigm pioneered by Koch et al. (2011) and manipulated the response-cue interval (RCI) to investigate whether the probability of a switch in the target voice influenced the switch cost only when the RCI allowed sufficient time for pre-cue reconfiguration. We found that a longer RCI did not increase the effect of switch probability on the switch cost – indeed, this effect was robust even at the short RCI when there was little time available for pre-cue reconfiguration. These findings challenge the pre-cue reconfiguration account of the effect of switch probability on the switch cost. The results are more consistent with tonic/sustained accounts, which posit that a high switch probability may lead to multiple task-sets (here: attentional templates) being held active in Working Memory (e.g., Dreisbach & Fröber, 2019), or to a lower "commitment" to the current task/attentional set, expressed computationally by a lower gain parameter of the task/attentional set activation function (e.g., Musslick & Cohen, 2021).

Keywords: Switch probability, Auditory attention, Switch cost
Presentation type: Oral presentation / Talk
Session: Multitasking and Cognitive Control I

Effects of story-based vocabulary training on the verbal memory of primary school children

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Learning vocabulary is an essential skill every child must practice frequently during schooling. In this study, we compared two different learning conditions to evaluate a beneficial and practicable tool for vocabulary training. The trial involved 176 participants (eight to 14 years; Mage: 10.8, SD: 1.64). Half of the children (grouplist: n = 88, 47 female) learned ten word-pairs (one German, one fictional word) within a word list. The other half (groupstory: n = 88, 45 female) studied the same words embedded in a short story. Memory was tested three times: directly after learning (t1), one day after learning (t2) and one week after initial learning (t3). An ANOVA with repeated measurement revealed a significant time and group interaction ($F(1.88, 293.45) = 6.06$, $p = .003$, $np2 = .037$) and a main effect of time ($F(1.88, 293.45) = 3.95$, $p = .022$, $np2 = .025$). Follow-up t-Tests, however, revealed no differences between the two groups at each memory measurement (all p's > .278). Further analysis showed an age effect, but solely for the story group. Here, the younger children improved significantly from t1 to t3 (t1: M: 3.61 SD: 2.30; t2: M : 4.25, SD: 2.45; t3: M = 5.39, SD = 2.93; $F(2, 70) = 12.34$, $p < .001$, $np2 = .261$) whereas the older children's memory performance did not change over time ($F(1.72, 72.04) = 0.449$, $p = .61$, $np2 = .011$). These results indicate that using short stories for vocabulary training might be most useful in younger children.

Keywords: Children, vocabulary learning, episodic memory, development
Presentation type: Poster Presentation
Session: Memory and Learning II

The illusory certainty: Information repetition and impressions of truth enhance subjective confidence in validity judgments independently of the factual truth

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People not only judge repeatedly perceived information as more likely being true (the so-called truth effect) they also tend to be more confident after judging the validity of repeated information. These phenomena are assumed to be caused by a higher subjective feeling of ease (i.e., fluency) when processing repeated (vs. new) information. Based on the suggestion that a higher number of coherent mental activations is promoting a fluency experience, we argue that besides repetition an already existing information network, that is (nonspecific) prior knowledge, can enhance fluency. Following this argumentation, information repetition as well as the act of judging incoming information as being true (vs. false) should feed into subjective confidence – independently of the factual truth (when judging under uncertainty). To test this, we reanalyzed two published data sets and conducted a new study. In total, participants (N = 247) gave 29,490 truth judgments and corresponding ratings of subjective confidence while attending two judgement phases (i.e., 10 minutes and 1 week after the exposure phase in each experiment). Results showed that (a) repetition (in 3 of 3 data sets) and (b) impressions of truth (in 2 of 3 data sets) were systematically related to higher subjective confidence. Moreover, we found (c) a significant positive interaction between repetition and impressions of truth after both intervals in all data sets. Our analyses further underline the moderating effect of time: Influences of repetition significantly decreased with increasing time interval. Notably, factual truth did not systematically affect any of the above effects.

Keywords: processing fluency, information repetition, subjective confidence, truth judgments, retention interval length
Presentation type: Oral presentation / Talk
Session: Misinformation

Alterations of Functional Network Topology Underlying Cognitive Flexibility and Stability in Schizophrenia

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Recently, it has been suggested that brain dysconnectivity in patients with schizophrenia might contribute to the wide-ranging cognitive deficits that characterize the disease. Graph theoretical analysis offers a unique method for studying how architectural alterations in large-scale brain networks may contribute to cognitive impairments in these patients. Implementing this technique, we analyzed the functional brain activity during a predictive switch-drift task from 22 patients with schizophrenia and 22 matched healthy controls. We specifically calculated task-based global graph measures for the functional networks that were activated during expected trials, trials requiring a flexible updating of predictions, and trials that required the stabilization of predictions. By implementing multivariate Bayesian generalized linear models, we found functional network alterations during all event types, which indicated less centralized, less integrated, and simultaneously less segregated network topology in patients with schizophrenia compared to controls. In addition, the rate of correctly detected switches, requiring flexible updating of internal models, predicted global graph measures differently for patients compared to controls. In particular, lower cognitive flexibility in patients was associated with stronger deficits regarding the integration of functional networks. Overall, the results suggest that the functional network topology in schizophrenia is less optimally organized compared to the neurotypical brain, which results in less flexible and stable cognitive processing.

Keywords: graph theory; connectome; cognitive control; executive functions; task-based fMRI; cognitive performance
Presentation type: Oral presentation / Talk
Session: Clinical Psychology

The Impact of Negative Affect on Source Memory

Nikoletta Symeonidou, Karin Häußermann, Johanna Klein
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While previous investigations have delved into the effects of emotional items and emotional sources on participants' source memory, it remains mostly unclear whether and how the internal affective state of participants impacts their source memory. Drawing from the cue-utilization theory (Easterbrook, 1959) and the affect-as-information approach (Schwarz & Clore, 1983), our study aimed to elucidate the impact of a negative affective state with varying arousal levels on source memory. According to the cue-utilization theory, a high-arousing affective state results in a narrowed attentional scope, thereby disrupting source memory. In contrast, the affect-as-information approach suggests that a negative affective state, regardless of arousal level, fosters a more thorough and analytical processing style, ultimately benefiting source memory. To investigate these hypotheses, participants in our study (preliminary N = 76) were exposed to short movie sequences designed to induce an anxious (negative high-arousing, n = 26), sad (negative low-arousing, n = 25), or neutral affective state (n = 25). They then underwent a standard source-monitoring task: They learned neutral word items paired with a male or female source face and were later asked to recognize learnt items along with their sources. Multinomial modeling was employed to analyze the memory data. Preliminary results indicated a significant impairment in source memory in the anxious group compared to the sad and neutral groups. There was no significant difference between the sad and neutral groups, which overall aligns with the predictions of the cue-utilization theory rather than the affect-as-information account.

Keywords: affective state, negative valence, arousal, source memory
Presentation type: Oral presentation / Talk
Session: Source Memory

Is preregistration worthwhile?

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Proponents of preregistration argue that, among other benefits, it improves the diagnosticity of statistical tests. In the strong version of this argument, preregistration does this by solving statistical problems, such as family-wise error rates. In the weak version, it nudges people to think more deeply about their theories, methods, and analyses. We argue against both: the diagnosticity of statistical tests depend entirely on how well statistical models map onto underlying theories, and so improving statistical techniques does little to improve theories when the mapping is weak. There is also little reason to expect that preregistration will spontaneously help researchers to develop better theories (and, hence, better methods and analyses).

Keywords: preregistration, confirmatory research, exploratory research, philosophy of science
Presentation type: Poster Presentation
Session: Methods

Wie wirken sich Open Label Placebos auf die sportliche Leistung, die Selbstwirksamkeitserwartung und die Angstsymptomatik bei Leistungssportlern aus?

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Zielgerichtetes Verhalten (und sportliche Leistung) wird von körperlichen und psychologischen Aspekten bestimmt (Balyan etal., 2016; Feltz et al., 2008; Woodman et al., 2001). Open-Label-Placebos (OLPs), d.h. die Wissentlichkeit der Placeboeinnahme, lassen einen positiven Einfluss auf die sportliche Leistung erwarten (Saunders et al., 2019; Swafford et al., 2019), wurden jedoch im Leistungssport kaum untersucht. Hier wurde überprüft, ob sich OLPs auf motorische Leistung, Selbstwirksamkeitserwartung und Angstsymptomatik auswirken. In einem Prä-Post-Interventionsdesign mit Wartekontrollgruppe wurde die protokollierte, tägliche OLP-Selbstadministration (Dauer zwei Wochen) systematisch untersucht. Die Instruktion wurde standardisiert (Kaptchuck et al., 2010). Die motorische Leistung beider Untersuchungsgruppen wurde in einem koordinativ anspruchsvollen 14 m-Slalomlauf (inkl. Vor-, Rück- und Seitwärtsbewegungen) erfasst (AV: Dauer, Fehleranzahl), Selbstwirksamkeitserwartung und Angst (trait/state) über Fragebögen. Die Interventionsgruppe bestand aus Leistungssportlerinnen (n=9) im Feldhockey (Bundesliganiveau), die Kontrollgruppe aus sportlich aktiven Breitensportlerinnen (n=9). Bis auf den wöchentlichen Trainingsumfang waren beide Gruppen sozioökonomisch vergleichbar. Vorläufige Analysen erbringen keine eindeutigen Hinweise auf einen OLP-Einfluss auf motorische Leistung (weder Slalomdauer noch Fehleranzahl) oder Angstsymptomatik (trait/state; alle F<2,3; alle ns.). Die motorische Leistung unterscheidet sich zwischen Gruppen (F(1,16)=34,58, p<,001), aber nicht zwischen Messzeitpunkten (F(1,16)=0,51; ns.). Die Selbstwirksamkeitserwartung stieg lediglich in der Kontrollgruppe an (t(8)=1,89; p<,05). Die vorliegenden Daten sind besser mit anderen Wirkmechanismen (z.B. Erwartungshaltung; Schäfer et al., 2021) als mit Effekten des Placebos in Einklang zu bringen, insbesondere bzgl. der Selbstwirksamkeitssteigerung in der Kontrollgruppe, die einen motivationalen Effekt widerspiegeln könnte. Auch methodischen Gründen (z.B. Drop-out-Rate) sprechen für weitere Untersuchungen im Leistungssport.

Keywords: Intervention; Training; Placebo; Motorik
Presentation type: Poster Presentation
Session: Clinical and Biological Psychology

Modeling Latency Processes in Source Monitoring

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Source monitoring encompasses memory (of item and source) and reconstructive (guessing) processes while determining the episodic context of previous experiences (Johnson et al., 1993). Based on observable response frequencies, the two-high-threshold multinomial processing tree (MPT) model of source monitoring (2HTSM; Bayen et al., 1996) provides probability estimates of these memory- and guessing-based processes. Heck and Erdfelder (2016) proposed a formal modeling approach integrating response times (RTs) into MPT models to estimate the relative speed of latent processes. Here, we present an application of this MPT-RT rationale to source monitoring and introduce the RT-extended 2HTSM model (2HTSM-RT). We conducted a standard source-monitoring experiment with words as items and screen positions as sources (N = 35). After categorizing continuous RT data into discrete bins from fast to slow responses separately for each individual, we calculated frequencies for all combinations of discrete attribution responses and RT bins. The main objective of the current study is to test whether the 2HTSM-RT fits RT data of a typical source-monitoring paradigm and to present more holistic information about the processes involved in source monitoring by understanding the relative speed of processes (reflected in the latency parameters) in addition to the accuracy of the process outcomes (reflected in the standard 2HTSM model parameters).

Keywords: source memory, source monitoring, multinomial modeling
Presentation type: Oral presentation / Talk
Session: Source Memory

From odorants to odors: basic physiological mechanisms

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Olfaction is one key sensory modality that ensures the survival of a species by guiding essential behaviors like foraging, locating a mate, and shelter, and avoiding predation in individuals. Odors then guide decision-making, and serve as sensory cues for a spatiotemporal map formation in the memory of animals. Hence, in this talk I will summarize our current understanding of how odor molecules interact with neural systems to evoke the sense of smell. I will highlight the distance covered by the molecules from the source to a searcher, and how different regions in the brain of that searcher interact to guide behaviors.

Keywords:
Presentation type: Oral presentation / Talk
Session: Cognitive and Neural Processes Underlying the Perception of Odors

N1 suppression for self-generated sounds is unaffected by predictability of sound identity and occurrence

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Recent theories describe perception as an inferential process based on internal predictive models that are adjusted by prediction violations (prediction error). Two modulations of the auditory N1 event-related brain potential component have been interpreted as reduced or enhanced prediction error for predictable sensory input: The sound-related N1 component is attenuated for self-generated sounds compared to the N1 elicited by externally generated sounds (N1 suppression). An omission-related component in the N1 time-range is elicited when the self-generated sounds are occasionally omitted (omission N1). Interestingly, in a previous study we did not observe a modulation of N1 suppression by manipulating the predictability of sound occurrence, but a modulation of omission N1. Here, we wanted to confirm that both N1 suppression and omission N1 are sensitive to the predictability of sound identity, as reported in the literature. We manipulated the predictability of sound identity in a self-generation paradigm in which button presses in one condition always produced the same sound or in another condition produced a sound randomly selected from a large set of sounds, thereby inducing a strong or a weak expectation for a specific sound. Surprisingly, omission N1 was modulated by manipulating the predictability of sound identity but not N1 suppression. This contradicts previous reports, further challenges prediction-related interpretations of the N1 suppression and supports alternative explanations like action-related unspecific suppression of sensory processing.

Keywords: N1 components, Self-generation, Auditory, EEG/ERP, Predictive Processing
Presentation type: Oral presentation / Talk
Session: Perceptual Learning

The Role of Selective Attention in Implicit Learning: Evidence for a Contextual Cueing Effect of Task-Irrelevant Features

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To select and de-select relevant and irrelevant information from the environment is the core of attentional mechanisms. But does selective attention modulate implicit learning? We tested whether the implicit acquisition of contingencies between features were dependent on the task-relevance of those features. We implemented the contingencies in a novel variant of the contextual cueing paradigm, using non-spatial predictive cues. In Experiment 1 (N=30), the predictive feature for target location was the shape of the distractors (task-relevant). In Experiment 2 (N=30), the color of distractors (task-irrelevant) cued target location. Results showed that participants learned to predict the target location from both the task-relevant and the task-irrelevant feature. For the purpose of further testing the significance of task-relevance, in Experiment 3 (N=30), we provided two predictive cues, shape (task-relevant) and color (task-irrelevant) simultaneously. Task-relevance modulated the learning of predictions from one single feature. We conclude that task relevance does not modulate implicit learning of associations per se, but rather the competition between predictive features via weighting processes. Attentional mechanisms thus do not seem to serve as filters at the encoding stage, but rather to weight the encoded features according to task-relevance.
Keywords: Implicit learning, Contextual Cueing, Visual Search, Attention
Presentation type: Poster Presentation
Session: Attention

How to (Better) Norm Word Ratings

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Dimensions like word concreteness and sentence plausibility are inherently difficult to measure empirically. One simple solution is to ask participants to rate the dimension of interest on an ordinal scale. For instance, we may ask, "how emotionally arousing is the word SKYSCRAPER, on a scale from 1 (not at all) to 7 (very)?". Such datasets typically report summary statistics of the mean (M), standard deviation (SD), and number (N) of ratings for each item. However, M-SD patterns in such datasets have been interpreted as problematic in recent years. In particular, Pollock (2018) has argued that high SDs at scale midpoints are evidence that concepts like concreteness are in fact dichotomous, and that mid-scale averages capture disagreement rather than a meaningful continuum. Is such “midscale disagreement” a problem? Perhaps not. Rather, simulations suggest that patterns identified as problematic in raw means and SDs result from such summary statistics inappropriately treating ordinal ratings as though they are on an interval scale. Using a more appropriate modelling approach (Cumulative-Link Mixed-Effects Models), we can (1) disentangle means and SDs from such statistical artefacts, and (2) explain more variance in relevant correlates. We recommend Cumulative-Link Mixed-Effects Models as a robust, general solution to norming items’ ratings.
Keywords: word, ratings, norms, concreteness, orthography, mixed-effects models, random effects
Presentation type: Oral presentation / Talk
Session: Methods in reading and language research

A Generative Model of Predictive Language Processing in Uncertain Stimuli Conditions

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Background: Language is a complex aspect of cognition closely related to memory and perception. Current psychosis research using Bayesian frameworks demonstrates an imbalanced weighting of prior information over incoming sensory evidence in hallucinations and delusions. Further investigation of this dynamic is warranted in relation to language capabilities, especially regarding agent certainty under ambiguous perceptual tasks. Generative models using frameworks such as Active Inference may be well-suited to describe and classify agent performance in tasks relevant to cognitive processes such as language. This may be an especially useful model to predict performance differences between low and high schizotypy groups, maintaining an expectation of prior overweighting in the high-schizotypy group during high-entropy or ambiguous stimuli.

Method: We constructed and fitted an Active Inference model of individual agent performance in a predictive language task to investigate variational free energy in relation to self-reported and objective semantic prior clarity. The language tasks requires participants to observe sentences with varying levels of entropy and levels of degradation of the sentence final word. Individual perceptions of words are recorded alongside prior clarity and prediction confidence; individuals are assessed on levels of psychotic-like experiences (PLE).

Results: Preliminary results show that individuals with higher levels of PLEs reveal less optimal behavior and higher free energy.

Conclusion: Bayesian frameworks are well suited to disentangle precision of priors and sensory evidence in perceptual inference tasks, making Active Inference a well-suited model to describe agent performance and perceptual ambiguity within dynamic environments.

Keywords: Active Inference, Bayesian, Language, Psychosis, Perception
Presentation type: Poster Presentation
Session: Language

Individual and ensemble object perception in naturalistic scenes

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Object positions can be encoded for each object individually or as an ensemble. The comparison of individual and ensemble perception has so far been studied with stimuli presented in front of simplistic backgrounds. Here, we investigated individual and ensemble object perception in complex naturalistic scenes. In the experiment, six kitchen objects were presented in either a structured kitchen background or an unstructured, texturized background, for one of three encoding times (100, 800, or 3200 ms) in the initial, Encoding phase. Later, in the Response phase, participants indicated via mouseclick the remembered position of one specified object (Individual condition) or the average position of all six objects (Ensemble condition) in the empty scene. While we did not find a systematic influence of scene background on individual and ensemble perception, we did find higher locating accuracy in the unstructured compared to the structured background condition for the 100 ms condition. Locating accuracy was also higher for individual compared to ensemble encoding in the 800 and 3200 ms encoding conditions. Additionally, eye movements speak for different strategies for encoding individual and ensemble information: More fixations and larger saccades were performed in individual compared to ensemble trials. Further, more fixations were directed toward the target objects in individual encoding, whereas more fixations were directed between these objects in ensemble encoding. Overall, our findings suggest that there is no general benefit of naturalistic scenes for individual and ensemble object perception, but that such benefits rather depend on stimulus encoding time.

Keywords: spatial perception, scene perception, object localization, eye movements, ensemble perception
Presentation type: Poster Presentation
Session: Perception II

The underlying mechanisms of post-stroke visual hypersensitivity : evidence for a relationship with selective attention and sensory thresholds

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Aims: After stroke, patients can experience an increase in their sensitivity for visual stimuli (visual hypersensitivity). They, for instance, feel overwhelmed when surrounded by bright lights or fast-moving visual stimuli. It has been proposed that these symptoms are related to atypical bottom-up sensory processing and impaired selective attention, but empirical evidence is currently lacking. The current study aimed to investigate the relationship between post-stroke visual hypersensitivity and sensory thresholds, sensory processing speed, and selective attention using computational modelling of behavioural data.
Method: During a whole/partial report task, participants (51 stroke patients, 76 orthopedic patients, and 77 neurotypical adults) had to correctly identify a single target letter that was presented alone (for 17 to 100 ms) or along a distractor (for 83ms). Based on the performance on this task the sensory threshold, sensory processing speed, and selective attention abilities of each participant were estimated within the framework of the Theory of Visual Attention.
Results: There was evidence, both on a group and individual level, for impaired selective attention and (to a lesser extent) lower sensory thresholds in patients with post-stroke visual hypersensitivity as compared to neurotypical adults, orthopedic patients, or stroke patients without post-stroke sensory hypersensitivity.
Discussion: These results provide a significant advancement in our comprehension of the underlying mechanisms of post-stroke visual hypersensitivity which can help us identify patients which are at risk for developing these symptoms, improve treatment protocols, as well as serve as a catalyst for further research.
Keywords: visual hypersensitivity, stroke, sensory hypersensitivity
Presentation type: Oral presentation / Talk
Session: Progress in TVA-based Visual Attention Research: From Fundamentals to Applications II

Bilateral transcranial direct current stimulation (tDCS) to dorsolateral prefrontal cortex and performance in judgment and decision-making tasks with inhibitory demands

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Transcranial direct current stimulation (tDCS) was used to investigate whether anodal stimulation of the left or right dorso-lateral pre-frontal cortex (DLPFC) compared to a sham group modulated performance on a number of judgment and thinking tasks: 1. vignettes measuring heuristic thinking, 2. logic syllogisms, and 3. the cognitive reflection test (CRT). Results from fifty-four participants showed that anodal tDCS to the right DLPFC was associated with an increase in cognitive reflection performance (correct answers to CRT and heuristic vignettes) as compared to left DLPFC and to sham. Logic thinking scores were reduced following anodal tDCS to the left DLPFC. A second experiment confirmed these results for the right DLPFC, and in addition showed that repeated (two sessions) stimulation also increased performance in the CRT. These findings are broadly consistent with an account of cognitive inhibition of prepotent responses in reflective thinking, that could not be explained by differences in impulsivity. Two further experiments investigated the role of dorsal and ventral areas in the Cambridge Gambling task, measuring quality of decision making (QDM), risk-taking (RT) and delay aversion (DA). tDCS real stimulation enhanced QDM and increased RT compared with sham, but no tDCS effects were found on DA.

Keywords: cognitive reflection, inpulsivity, brain stimulation, decision-making
Presentation type: Oral presentation / Talk
Session: Modulation of Impulsive Choice and Impulsive Action

Why we study behavior—and how: On the utility of observing action

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In 2000, the APA's Board of Scientific Affairs announced the Decade of Behavior (DoB) to promote the importance and support for the study of human action (Kendall, 2000). Nevertheless, the proportion of published studies that include measures of behavior has declined steadily (e.g., Baumeister Vohs, & Funder, 2007, Banks, Woznyj, & Mansfield, 2021). In this talk, we will provide a personal account on why and how we are enthusiastic about studying behavior. Specifically, we will (a) discuss why studying behavior yields uniquely informative and relevant insights, (b) provide a practical definition of what constitutes a behavioral measure, and (c) present a program of experimental research on intergroup criticism where behavioral measures have allowed us to make unique predictions and yield surprising findings. We will discuss how to increase actual behavioral research.
Keywords: behavior, experiment, intergroup sensitivity effect
Presentation type: Oral presentation / Talk
Session: Towards a Sustainable Experimental Psychology: Theory, Replicability, Behavior

Anticipatory eye movements for prevention actions

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The human action repertoire not only contains effect-producing, operant actions. Effect-precluding, prevention actions are commonplace in everyday behavior just as well. How these prevention actions are represented, however, has widely been neglected in the past. Recent proposals in the literature suggest that prevented, not occurring, events can evoke similar control mechanisms as produced action effects during action selection and execution. But there are hints that this similarity cannot be extended to action monitoring. Here we present a series of experiments investigating spontaneous anticipatory eye movements for prevented events compared to produced visual action effects. Thereby, we show reduced anticipatory eye movements for prevention actions, implying that action monitoring for prevention and operant actions indeed differs.

Keywords: Prevention, anticipatory eye movements, ideomotor framework, avoidance
Presentation type: Oral presentation / Talk
Session: Action Control

How memory and future thinking structures the experience of collective anxiety: Turkish elections

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The present research explores the role of collective memory and future thinking in structuring the experience of collective anxiety. We aimed to see whether and how various reconstructions of the collective past inform and influence people's appraisals of anxiety for their group's future. To address this question, we conducted an experimental study with two factors. The data was collected in Turkey 1-month before the presidential elections in May 2023. For the future event factor, participants were instructed to imagine one of the two alternative scenarios for the election night in which one or the other candidate wins the election. Next, they wrote about the main issue that they are anxious about for their country's future. Participants were then assigned to either the collective or personal memory condition. Participants in the collective memory condition remembered an event from the past that they think provides a basis for their collective anxiety, while those in the personal memory group simply remembered an important personal event. After these experimental manipulations participants appraised their anxieties using the cognitive model of anxiety addressing appraisals of harm, severity, and perceived efficacy. Analyses revealed that remembering collective events did influence people's appraisals of collective anxiety, with people in the collective memory condition having a more intense experience of collective anxiety. This effect, however, was moderated by sociopolitical identity.

Keywords:
Presentation type: Oral presentation / Talk
Session: Collective remembering: Social processes and the representation of public events in human memory

Comparison of subjective and objective information about the pre-crash phase

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More and more modern cars in Germany are equipped with an Event Data Recorder (EDR) that records various parameters, such as speed, steering angle, and the operation of the brake and accelerator pedals, in the last five seconds before an accident [1]. Thus, the EDR provides objective insights into the pre-crash phase and makes it possible to compare these information with the subjective statements of accident participants.

The AARU (Audi Accident Research Unit) analyses in an interdisciplinary manner traffic accidents that have occurred on Bavarian roads and in which a vehicle of the AUDI Group was involved. In order to understand the cause of an accident, standardized telephone interviews are conducted with the drivers involved in the accident. As part of the study, the statements of 131 drivers about the course of the accident, the driven speed and possible reactions before the accident are compared with the data recorded by the EDR.

All accidents whose analysis could be completed by the end of October 2023 were included, provided that both an interview with the driver and data from the EDR were available. All accidents analyzed in this study occurred between 2017 and 2023.

There have been found differences concerning the driven speed and the reaction. The course of the accident reported by the drivers was mostly plausible, only in a few cases the EDR data showed another sequence of events leading to the accident.

[1] Bosch Automotive Service Solutions. (2015). CDR Product Brochure: Crash Data Retrieval. https://cdr.boschdiagnostics.com/cdr/manuals

Keywords: Traffic accident, Credibility of statements, Accident reports, Event Data Recorder
Presentation type: Oral presentation / Talk
Session: Traffic Psychology I: Human behavior and traffic safety

Developmental differences in valence and arousal perception of dynamic emotion expressions

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Investigating emotion perception across the lifespan is vital for understanding social development. Research indicates children exhibit a positivity bias, perceiving facial (Vesker et al., 2018), verbal (Bahn et al., 2017), and body movement (Preißler et al., 2023) information as more positive, while adults display a negativity bias. However, using unimodal emotion stimuli, like images or word lists, disregards the dynamic and multifaceted nature of emotions. Studies often include stimuli featuring one age group (Ma et al., 2015), neglecting the diversity in our environment. To address these limitations, we created a dataset of 16 realistic avatars representing four age groups (children, adolescents, young and older adults), animated to express four emotions (anger, sadness, happiness, happy-surprise). It includes two conditions: pure emotional expressions (visual) and expressions with articulated sentences matching the emotional states shown (visual-verbal). In an online study, we asked two groups of children to rate each emotion on valence (n=28, m=6.4 years, 13 females) and arousal (n=26, m=6.4 years, 16 females) using a 5-point Self-Assessment Manikin scales (Bradley & Lang, 1994). Twenty-eight adults (m=25 years, 14 females) completed both scales. Our results show that children found negative emotions as more arousing compared to adults [$F(1, 52)=3.873$, $p=.05$, $\eta 2=.069$] and positive emotions as more positive [$F(1, 54)=4.197$, $p<.05$, $\eta 2 =.072$]. Overall, the positivity bias in valence persists in children for static and dynamic emotion presentations. In contrast, there is an inverse effect for arousal in children, indicating heightened sensitivity to negative expressions in dynamic compared to static settings.

Keywords: developmental changes, emotion perception, facial expressions
Presentation type: Oral presentation / Talk
Session: Cognitive Development across the Lifespan

Do siblings sound similar? Acoustic cues and kinship recognition in human voices

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Kinship recognition is known in various species and evolutionarily considered a function of inbreeding avoidance and nepotism. In humans, kinship may be a crucial element of social interactions. While there are a number of studies on kinship recognition based on faces, little is known about kinship recognition in voices. Using vowel and sentence utterances, we investigated whether voices of female pairs with different degrees of relatedness (monozygotic twins, dizygotic twins and non-twin siblings) are distinguishable from unrelated female pairs (with control pairs matched to siblings for mean intra-pair age difference). Listeners' performance to detect sibling pairs was significantly above chance (d' = .467) and particularly high for monozygotic twins (d' = .645). Furthermore, acoustic analyses (including F0-F4, formant dispersion, HNR, jitter and shimmer) suggested that a smaller fundamental frequency (F0) difference within a pair of voices was correlated with higher kinship judgement, in particular with simple vowel stimuli (r = -.356). Moreover, smaller differences in F1-F2 vowel space distance were associated with higher kinship judgement in sentences. These findings establish empirical evidence for human kinship recognition from voices, and provide initial evidence regarding the acoustic cues that mediate human kinship judgements from voices.
Keywords: voice, kinship recognition, twins, similarity, acoustic cues
Presentation type: Poster Presentation
Session: Perception I

Socially patterned attention styles in contexts of social inequality

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Behaviours and their associated cognitive mechanisms do not exist in isolation, rather they are embedded in a world that is naturally social, and rich in context. Using a joint version of Posner's spatial cueing paradigm, I demonstrate how high-level beliefs about situational contexts modulate automatic orienting of attention. In these tasks, participants see cues and detect targets at same or different locations, while interacting with an unseen partner. Crucially, they are led to believe that the cues represent the gaze location of their partner, a social cue that we have found generates larger inhibition of return (IOR) effects compared to when they believe the cues are computer generated. In this current study, we further situated participants and their unseen partner in a fictional society that either exhibited high or low social inequality. Interestingly, we found that this high-level situational context modulated socially cued IOR effects such that they were reduced in the high inequality compared to low inequality context. I interpret this result in line with our previous work showing reduced socially cued IOR in low cooperative interactions. I then propose this as initial evidence for how social environments play an important role in scaffolding automatic patterns of visual attention, and how in certain joint contexts this may be beneficial in constraining our bias for novelty.
Keywords: Visual Attention, Joint Tasks, Social Context, Societal Inequality
Presentation type: Oral presentation / Talk
Session: Better together? Benefits and costs of joint action

Navigating the Uncharted: TVA's Journey into Simulated Visual Foraging

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The Theory of Visual Attention (TVA) has predominantly found application in highly structured experimental paradigms, including letter-based whole- and partial-report tasks, and temporal order judgments. This focus on particular tasks is driven by the necessity to formalize and the paradigms with align with TVA's quantitative model. In our ongoing research, we aim to extend the utility of TVA by applying it to a more flexible task, visual foraging. Visual foraging, a spatially oriented selection task where participants collect diverse items from "patches", introduces several challenges to TVA. Unlike traditional visual search experiments that consist of discrete trials with single reactions, foraging unfolds as a continuous task, where foragers "navigate" through an environment, posing questions that have yet to be addressed within the TVA framework. For instance, how do TVA's attentional control parameters dynamically evolve during foraging within a patch? How does the functional viewing field adapt to facilitate a more efficient spatial organization? In the presence of uncertainty regarding remaining targets in a patch, how long does the visual system "wait" for target-related information before transitioning to a new search area? The implementation of a generative simulation brings these questions to the forefront. We compare simulated foraging to experimental data to highlight current shortcomings in TVA and to identify potential solutions, providing insights into the adaptability of TVA in addressing challenges posed by more flexible, real-world visual tasks.

Keywords: Visual attention, visual foraging, TVA, theory of visual attention, modelling
Presentation type: Oral presentation / Talk
Session: Progress in TVA-based Visual Attention Research: From Fundamentals to Applications I

Unraveling the Link Between Language and Scene Knowledge in Children

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It has been suggested that objects in scenes adhere to semantic and syntactic rules similar to words in sentences and that scene and language processing might share common mechanisms. Here we aimed to investigate this relationship further by including children (age range: 6-10) with typical language development and developmental language disorder, encompassing a broad language ability spectrum. In addition to language tests, we tracked children's eye movements during a free viewing task involving scenes with semantic and syntactic violations, and a search task with objects in expected or unexpected locations. Additionally, children arranged a dollhouse with 61 objects. Results showed that dwell time on semantic and syntactic violations increased with the children's semantic and syntactic language scores, and RTs for finding objects at unexpected locations increased with syntactic language scores.These findings indicate that children's ability in semantic and syntactic aspects of language might go hand in hand with responses to corresponding violations in scenes. Additionally, as semantic scores increased, children placed objects more accurately in the dollhouse (correct rooms). While we did not find a relationship between syntactic language scores and the distance between objects in the dollhouse, we did observe children who looked longer at syntactic violations in the free viewing task also placed the related objects in the dollhouse more closely. We did not find a similar relationship for dwell times on semantic violations. In summary, our findings substantiate a potential link between scene and language knowledge, underscoring the need for further investigations.

Keywords: Eye movements, scene knowledge, semantics, syntax
Presentation type: Poster Presentation
Session: Perception I

Going beyond the waist-to-hip ratio: Investigating the role of curvature for female body attractiveness

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In studies of aesthetics, the waist-to-hip ratio (WHR) is often linked to the attractiveness of the female body, with a ratio of 0.7 typically considered optimal. However, this idea not only overlooks the WHR's ambiguity in representing body form, but also the fact that attractiveness can vary depending on the viewing angle and pose. In fact, one and the same body can appear more or less attractive based on the perspective from which it is viewed as well as the pose it takes. To account for the view dependence of attractiveness, one might use the two-dimensional (2D) WHR, which also varies with the viewing angle. Moreover, one could also assume that attractiveness is determined by the curvature of the body. To investigate the relative effects of both variables, we created photorealistic images of female bodies with varying WHRs and poses rendered from different viewing angles. The results indicate that curvature of the body contour is able to explain variance in beauty ratings beyond the (2D-) WHR.

Keywords: waist-to-hip ratio, curvature, attractiveness, body shape, pose, viewing angle
Presentation type: Oral presentation / Talk
Session: Experimental Aesthetics II

Applying Multinomial Models to Examine Partner Modelling in Collaborative Learning

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Learners are often required to remember information about their (potential) learning partners, like their knowledge levels regarding several topics or their past participation level. Such so-called *partner modelling* processes help to make informed judgements about whom to select as a learning partner or to judge whether learning partners can provide help or need explanations. In two (pseudo-collaborative) experimental studies, we examined how partner models are formed in different computer-supported collaborative learning contexts. We applied multinomial processing tree models to measure memory processes unconfounded by guessing biases. In experiment 1 ($N = 85$), participants received information on the competence or participation level (high vs. medium vs. low) of 36 potential learning partners. High and low levels of participation were equally well remembered and better than medium levels. Regarding competence, high competence was better remembered than both, medium and low competence. In experiment 2 ($N = 168$), participants received information on the knowledge levels (high vs. medium vs. low) of a single learning partner (expert vs. intermediate vs. novice) regarding 60 topics. For the expert and intermediate partners, high and low levels were better remembered than medium levels. For the novice partner, low levels were remembered better than high and medium levels. Generally, the knowledge levels of the expert and novice were more accurately modelled than those of the intermediate partner. Findings support the general idea of context-dependent source memory regarding information about other persons and complement learning-related partner modelling research.

Keywords: Source Memory, Partner Modelling, Collaborative Learning, Multinomial Processing Tree Models
Presentation type: Oral presentation / Talk
Session: Source Memory

Making Judgments of Learning Either Enhances or Impairs Memory: Evidence from 17 Experiments with Related and Unrelated Word Pairs

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We report 17 experiments in which participants predicted versus did not predict their future memory during learning (judgments of learning, JOLs). In all experiments, making JOLs increased the difference in cued-recall performance between related and unrelated word pairs. Making JOLs produced numerically better memory for related pairs (positive reactivity) and numerically worse memory for unrelated pairs (negative reactivity) in almost all experiments, but either effect was reliable in just half of the experiments. Small-scale meta-analyses revealed that both positive and negative reactivity were of small-to-moderate size. Individual experiments that showed positive reactivity tended not to show negative reactivity, and vice versa. These findings indicate that negative JOL reactivity for unrelated pairs is similarly large and robust as positive reactivity for related pairs. They favor the cue-strengthening hypothesis with dual-task costs over other theories and raise the practically relevant possibility that monitoring could have detrimental effects on learning in educational settings.
Keywords: metamemory, judgments of learning, reactivity, cued recall, episodic memory
Presentation type: Oral presentation / Talk
Session: Recent Insights on the Basis, Accuracy, and Impact of Metacognitive Judgments

Using LLMs to Automate the Analysis of Verbal Reports

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In this presentation, we argue that verbal reports, often overlooked due to their perceived subjectivity and inefficiency for large-scale analysis, can be invaluable in understanding decision-making processes. Drawing from Mechera-Ostrovsky's framework, we demonstrate that such reports can validate the formal components in cognitive models, as well as explore their more implicit assumptions. To make the collection and analysis of verbal reports more efficient, we introduce a new, user-friendly platform, which is integrated in the jsPsych library, that uses advanced machine-learning methods to capture and automatically analyze verbal reports collected during an experiment.
We demonstrate the capabilities of this platform through a case study on a memory task. In this study, we provide a detailed explanation of our data evaluation process, which includes Speech Recognition, Auto-Summarization, and Text Vectorization. We will show how the text-vectorization step involves converting summaries of text into high-dimensional vectors, which then enables the use of numerical methods like clustering, hypothesis testing, and visualization. Our case study serves as a fundamental illustration, presenting a flexible structure that can be conveniently adapted to different pipelines, tasks, and applications. Overall, our approach provides a scalable and accessible alternative for translating qualitative data into quantified data, opening up new options for the way verbal reports can be utilized in cognitive research.
Keywords: natural language processing models, self-report, verbal description, decision-making, cognitive model validity
Presentation type: Oral presentation / Talk
Session: Decision Making I

Assessing Mastery During Adaptive Retrieval Practice: An Alternative for Traditional Knowledge Testing?

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We will present first results from a project in which we test whether and under which conditions learning data from students' self-study with an adaptive digital retrieval practice programme (MemoryLab.nl) is a reliable predictor of subsequent test performance. As part of this project, we extended the existing computational model of fact learning (Memorylab, van Rijn et al., 2009, Sense et al., 2016) to make predictions about long-term retention of practiced information, based on the responses registered during adaptive retrieval practice. More specifically, we propose a mastery criterion that can be reached during practice, based on a cognitive model of the memory strength after a delay of 24 hours. We will use this to determine at what point learners have practiced an item sufficiently. The to-be-presented first experiment will test to what extent reaching mastery during self-study sessions indeed predicts subsequent recall, compared to no-mastery and compared to other descriptors of the practice phase (such as the number of (accurate) recalls, repetitions, or changes in response times over the course of practice).

van Rijn, H., van Maanen, L., & van Woudenberg, M. (2009). Passing the test: Improving learning gains by balancing spacing and testing effects. Proceedings of the 9th International Conference on Cognitive Modeling, 110–115.
Sense, F., Behrens, F., Meijer, R. R., & van Rijn, H. (2016). An Individual's Rate of Forgetting Is Stable Over Time but Differs Across Materials. Topics in Cognitive Science, 8(1), 305–321. https://doi.org/10.1111/tops.12183

Keywords: retrieval practice; cognitive modelling; assessment
Presentation type: Oral presentation / Talk
Session: Adaptive Retrieval Practice and its Applications in Education and Health

Don’t judge a book by its cover: the influence of perceived trustworthiness on value-based decision-making

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Trustworthiness plays a crucial role in facilitating effective and successful interactions. For example, perceived trustworthiness influences our behavior when investing (van ’t Wout & Sanfey, 2008) and during strategic decision-making (Johnson & Mislin, 2011). Interestingly, perceived trustworthiness plays a critical role in initial interactions, but its influence becomes smaller over time (Chang et al., 2010). Here, we investigated the impact of perceived trustworthiness on a crucial aspect of the human adaptive behavior, value-based decision-making. In two experiments, participants played a modified version of "The Door Game," in which they searched for a reward behind one of two doors based on the advisors' advice (Van der Biest et al., 2020). The advisors were computer-generated faces classified as either trustworthy or untrustworthy (Oosterhof and Todorov, 2008). Crucially, the advisor’s validity was the same for both levels of trustworthiness (i.e., 66%). In Experiment 1 (N=150), we found a higher rate of advice following for trustworthy advisors, but only during the first half of the experiment. In our preregistered replication (Experiment 2, N = 300), we found a similar pattern for the advice following rate, thereby we successfully replicated the results obtained in Experiment 1. In addition, we found that during the initial encounters (i.e., block one) participants were faster to decide when the advisor was trustworthy compared to untrustworthy. Overall, our results highlight the reliance on social information in value-based decision-making, while additionally, emphasizing rapid adjustments of trust beliefs and its dynamic nature over time.

Keywords: Social Cognition, Trustworthiness, Decision-Making
Presentation type: Poster Presentation
Session: Decision Making

Alleviating 4 Million Cold Starts in Adaptive Fact Learning

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When it comes to memorising factual knowledge, there are systematic differences in learner ability that mean some learners memorise facts more easily than others. Similarly, some facts are systematically easier to learn than others. An adaptive learning system that detects and adjusts to these individual differences in ability and difficulty can improve learning efficacy by enabling learners to study at an appropriately challenging level. Such a system faces the cold start problem whenever it has not yet had the opportunity to adapt to its user or to the content. Having more accurate initial predictions of ability and difficulty can alleviate the problem.

Using authentic learning data from 140 thousand students, we evaluate several methods for alleviating the cold start problem in the adaptive fact learning system MemoryLab. This system adaptively estimates a separate rate-of-forgetting parameter for each fact that a learner practices, by interpreting the accuracy and latency of the learner's responses to retrieval prompts through a computational cognitive model. We show that data-driven prediction of the system's rate-of-forgetting parameter leads to more accurate estimates of learning at the start of a practice session, particularly when that prediction is based on fact-specific difficulty information. The observed improvements are similar in magnitude to those found in an earlier lab study, where using the predicted rate-of-forgetting values as starting estimates in a MemoryLab practice session significantly increased retention on a posttest. Based on the current large-scale evaluation, we expect that comparable retention gains can be achieved in real-world educational practice.

Keywords: cold start problem, learning and memory, individual differences, ACT-R, Bayesian modelling
Presentation type: Oral presentation / Talk
Session: Enhancing Learning and Memory

Adaptive Retrieval Practice: from Optimized Learning of Vocabulary to Tracking Memory Decline in Clinical Populations

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A long tradition of research in cognitive psychology has allowed for the development of computational models of declarative memory that aim to capture how individuals acquire, retain, and forget information over time. These models use behavioral measures, such as the accuracy and latency of retrieval attempts, to estimate parameters of internal memory processes, allowing them to predict future memory retrieval performance. Interpreting learners' responses in a retrieval task through the lens of a cognitive model provides a sensitive, personalized measure of memory performance with both educational and clinical applications.

In the educational domain, we can employ cognitive memory models in computerized adaptive learning applications that help learners memorize information, such as the MemoryLab learning system (previously SlimStampen). This system for adaptive retrieval practice continually adjusts the scheduling of items based on the memory performance of the individual student, allowing them to learn vocabulary items and other paired associates more effectively than with traditional methods. More generally, model-based insights in a student's memory enable a more principled assessment of students' mastery of the learning material.

In clinical settings, adaptive retrieval practice can also provide an accessible, low-cost, and non-invasive measure of patients' memory performance. By measuring the speed and accuracy of memory retrievals, we can quantify individual differences in forgetting speed through the parameters of the memory model with high reliability and sensitivity. Clinical applications of this technique include identifying and tracking memory decline, as well as tracking changes in memory performance that result from interventions, disease or injury.

Keywords: Adaptive learning, cognitive modeling, memory, retrieval practice
Presentation type: Oral presentation / Talk
Session: Adaptive Retrieval Practice and its Applications in Education and Health

The role of acute stress in narrative comprehension across age groups.

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Narrative comprehension, a set of interrelated basic cognitive skills, is essential for societal participation. While it is an open question if acute stress boosts or impairs performance in basic cognitive skills, no study examined the influence of acute stress on narrative comprehension. Interestingly, in basic cognitive tasks, older people seem able to apply more effective coping strategies than younger people. To explore the influence of stress on narrative comprehension in different age groups, two pre-registered experiments tested a student (M = 23 years, N = 203) and an elderly sample (M = 67 years, N = 216) using a bridging event generation task. Participants read picture stories with three panels, with the middle panel blanked, and indicated the content of the blanked panel (i.e., the bridging event). In both experiments, the experimental group was exposed to a stress induction while the control group performed a neutral stress-free task before the bridging event test. While acute stress negatively impacted bridging inference generation and confidence in answers in the student sample, the elderly sample was unaffected by the stress induction. We speculate that the elderly participants are more effective in applying coping strategies than the student sample. These findings contribute to a deeper understanding of the relationship between acute stress and visual narrative comprehension, emphasizing the importance of considering age as an important influencing factor.

Keywords: Narrative Comprehension, comics, age, stress.
Presentation type: Oral presentation / Talk
Session: Cognitive Development across the Lifespan

Humans adaptively select different learning strategies in different tasks

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Ghent University

The Rescorla-Wagner rule remains the most popular tool to describe how humans quickly learn to adapt to novel tasks and develop task-specific representations. Nevertheless, it cannot fit human learning in tasks that require higher levels of control. Previous work proposed several hierarchical extensions of this learning rule. However, it remains unclear when a flat (non-hierarchical, like Rescorla-Wagner) versus a hierarchical strategy is optimal, or when humans implement it. To address this question, we applied a nested modelling approach to evaluate multiple models in multiple reinforcement learning tasks both computationally (which approach performs best) and empirically (which approach fits human data best). We consider ten empirical datasets (N = 410) divided over three reinforcement learning tasks of varying complexity (and thus control requirements). Our results demonstrate that different tasks are best solved with different learning strategies; and that humans adaptively select the learning strategy that allows best performance. Specifically, while flat learning fitted best in simple tasks, humans employed hierarchically layered models in more complex tasks.

Keywords: Adaptive model selection, Hierarchical learning, Cognitive control, task representations
Presentation type: Oral presentation / Talk
Session: Changes for learning: how do changes in task-specific representations shape adaptive cognitive control?

Neural synchronisation for cognitive control

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Cognitive control requires binding packages of information (e.g., stimulus-response bindings) together on the fly, often for just a brief period. However, it remains unclear how humans can do this. We propose that neural oscillations at theta frequency (4-8 Hz) are key in this respect. We present a computational model of how theta can synchronize specific neural modules. Thus, the model can functionally construct the required packages of information depending on the task at hand; and quickly dismantle them when no longer needed (e.g., in the next trial). In this model, theta amplitude and theta frequency are two dimensions that can be controlled for optimal cognitive control. Empirically, we demonstrate that theta amplitude correlates with model predictions; and that increased amplitude relates to increased neural synchronisation (as measured with EEG), presumably to create the required packages of information. The model predicts that theta frequency decreases when a more difficult task is upcoming, because slower theta waves allow more time for competing representations to settle. This decreased frequency should be visible in both neurophysiology (measured via EEG) and in behavior (measured via accuracy). In line with model simulations, we find empirically in the EEG spectrum that a cue predicting an upcoming difficult (relative to easy) stimulus, decreases theta frequency. Similarly, theta frequency measured at the behavioral level is slowed down on such difficult stimuli. This result demonstrates how different aspects of theta oscillations (amplitude and frequency) can be recruited for cognitive control, and how they can be manifested in EEG and behavior.

Keywords: cognitive control, learning, computational modeling, EEG
Presentation type: Oral presentation / Talk
Session: Feature binding in action control and beyond I: How binding contributes to stimulus-response learning, cognitive control, and event segmentation

Face masks impede face recognition by slowing down information processing: a diffusion model analysis

Janne Vöge, Joshua Lorenzen, Veronika Lerche
Kiel University

Since the outbreak of the COVID-19 pandemic the use of face masks in order to contain the risk of infection has become common. However, face masks also affect social interactions, for example by impeding face recognition. In an online study based on a within-subjects design, 36 participants observed masked and unmasked faces before they performed a face recognition task with masked and unmasked faces. In contrast to prior studies, data were analyzed using the diffusion model (Ratcliff, 1978) which allows to differentiate between cognitive processes underlying face recognition performance. We hypothesized that the poorer recognition performance for masked faces and the incongruency effect (between study and test phase) are caused by differences in drift rate, the diffusion model parameter which reflects speed of information processing. The results confirmed the hypotheses. More specifically, drift rate was highest when faces were unmasked at both study and test phase and lowest in the incongruent mask conditions. These findings can be explained by the impairment of holistic representation of masked faces and the additional violation of the encoding specificity principle for incongruent mask conditions. Our study shows that the use of face masks impedes face recognition via a reduced drift rate.

Keywords: face recognition, face mask, diffusion model, holistic representation, encoding specificity principle
Presentation type: Poster Presentation
Session: Perception II

Matching to other people is not equally beneficial: The role of social class for person-culture match effects on well-being

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People tend to experience higher well-being when their characteristics (e.g., beliefs, values) match with those of their culture. Recent research indicated that social class is also a relevant form of culture that should be considered when investigating person-culture match effects on well-being. Thus, the present research investigated person-culture match effects on well-being when individuals perceive a value match with people of different social classes. In particular, we manipulated whether participants' value preferences match with the value preferences of people from their own social class, a lower social class, or a higher social class. Across four studies, we operationalized social class in terms of individuals´ educational attainment (N study 1 = 353), employment status (N study 2 = 402), and income level (N study 3 = 623) as well as individuals´ subjective social class (N study 4 = 479). Results suggest that perceiving a value match with other people is always beneficial for individuals´ well-being. However, the well-being benefits of a value match were dependent on the social class, individuals perceived a matched with. While matching to people from their own social class or to people from a higher social class resulted in a higher well-being, a value match with people from lower social class resulted in a lower well-being. Thereby, the results might point to the personal desirability of a match as key driver of person-culture match effects on well-being.

Keywords: social class, well-being, person-culture match, values
Presentation type: Oral presentation / Talk
Session: Social Psychology

Understanding gender differences in renewable energy participation: A DCE with Elektrizitätswerke Hindelang (EWH) Customers and Panel Participants

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Previous research has indicated a heightened environmental concern among women, alongside a propensity to adopt pro-environmental behavior (Zelezny et al., 2000). Yet, the underrepresentation of women in energy communities is at odds with these findings (Hanke and Lowitzsch, 2021). Our study aims to provide empirical insights into the specific attributes of renewable energy projects that influence engagement decisions, examining the conditions that sway investment and participation across genders. We aim to highlight the gender disparity particularly in decision-making authority (Kuschan, 2020) and investment levels (Fraune, 2015), as well as gendered in-group preferences (Rudman and Goodwin, 2004). We employ a discrete choice experiment (Holmes et al., 2017) as part of an online survey to elucidate the preferences of two distinct samples: customers of a Bavarian energy community (N = 132) and German citizens recruited from a panel (N = 773). We included attributes such as energy source, right to vote, minimum investment threshold, annual benefit, capital commitment period, likelihood of capital loss, and opportunities for involvement.
Initial findings suggest that in the panel sample, women are less likely to choose male-dominated energy community investments ($b = -0.08$, $p < 0.001$). Additionally, financial incentives appear to be less important for woman when choosing ($b = -0.05$, $p = 0.011$). Similarly, women from the Bavarian energy community showed a preference for energy community investments when more women are involved ($b = 0.12$, $p = 0.029$).
Keywords: Renewable Energy community, Gender, Discrete Choice Experiment, Pro-environmental Behavior, Renewable Energy, Energy Transition
Presentation type: Poster Presentation
Session: Human Factors I

Genius in a bot? Impact of Artificial Intelligence on Artperception

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Image- and text-generating artificial intelligence (AI) such as Dall-E 2 and ChatGPT. are finding their way into creative work everywhere. The question of authorship therefore also raises the question of perceived creative achievement. How creative do we perceive the work of an AI to be compared to a work created by a human, and how does it affect our perception if we create the work in collaboration with an AI? Who or what contributed how much to the result in terms of self-perception and the perception of others? To conduct systematic research we used classic creativity measurements (e.g., Rhodes 4P, Creative Self-Efficacy) and expanded the survey to include art and qualitative elements. AI-generated images were presented to subjects under cover stories of varying authorship: created by a human vs. AI, trained as an artist vs. trained as a craftsperson, own AI cocreated vs foreign AI cocreated..
Keywords: empirical aesthetics, art perception, generative art, experience, artificial intelligence, creativity
Presentation type: Oral presentation / Talk
Session: Artificial Intelligence

Grapheme processing in synesthesia during continuous flash suppression

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Grapheme-color synesthetes experience colors when viewing objectively achromatic alphanumeric characters. One major hypothesis states that the color sensation emerges from co-activation of color-selective neurons during sensory processing. In this pre-registered study (https://osf.io/xhd5y), we examine the concurrent hypothesis that color-inducing graphemes are highly salient shapes for synesthetes, which scale up the neural gain during visual processing and increase the probability for a later irregular shape and color integration. Synesthetes and matched controls performed a grapheme detection task while chromatic pattern masks were flashed into the dominant eye. This technique renders target images invisible for an elongated time contingent on their saliency. We predicted a faster break from suppression for color-inducing compared to non-color-inducing graphemes in synesthetes. Because chromatic masks suppress colored targets more than uncolored ones, the opposite pattern of slower responses for color-inducing graphemes should occur from color co-activation. The results showed overall higher reaction times in synesthetes compared to controls, and no reaction time difference between color-inducing and non-color-inducing graphemes overall. The data suggests that both co-activation and saliency do not cause color experiences in synesthesia.

Keywords: Perception, Attention, Synesthesia, Multisensory Perception
Presentation type: Oral presentation / Talk
Session: Crossmodal Perception / Synesthesia

Partial transfer of perceptual learning on a visual crowding task in the peripheral visual field

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Visual crowding, the challenge in recognizing peripherally presented objects surrounded by distractors, can be mitigated through perceptual learning. This study examines the learning-induced reduction of crowding using a Landolt-C gap-detection task, investigating whether learning in one visual hemifield (left/lower) transfers to the respective opposite hemifield (right/upper), and vice versa. Participants had to indicate on each trial the relative position of the opening of the Landolt-C (gap detection: top, bottom, left, right, 4AFC) that always was presented at 10° eccentricity and that was either radially or tangentially flanked by two ring-shaped distractors. Sixty-six normally sighted subjects (aged 18-45) underwent training in either the left/right or upper/lower visual hemi-field on the Landolt-C task over four sessions. During training, a 2-down, 1-up adaptive procedure adjusted the spatial distance of flanker distractors to the Landolt-C, resulting in 70.7% correct gap detection thresholds. Pre- and post-training, participants performed the task in both hemifields at a fixed target-flanker distance of 2° eccentricity for radial and tangential flanker conditions. Results reveal significantly improved performance in the task with the fixed target-flanker distance after training in both trained and untrained hemifields. However, the learning effect is smaller in the untrained hemi-field. The findings suggest that perceptual learning of a Landolt-C optotype crowding task yields improvements that partially transfer to the respective locations in the opposite hemifield. This finding could benefit training programs for persons with central vision loss, who rely on peripheral vision for daily tasks.

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Keywords: Crowding, Perceptual Learning, Peripheral Vision
Presentation type: Poster Presentation
Session: Perception III

Does the perception of hand-arm vibration interfere with cognitive control?

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Hand-arm-vibration emerges almost always when using hand craft tools. More importantly, in many cases the vibration cannot be avoided nor can the handicraft activities be replaced by automatization as the expertise of the craftsmen is importance for those tasks (e.g., grinding, drilling). But especially for tasks involving massive forces, it is essential for the craftsmen to be attentive in order to avoid accidents or damages. To provide technical assistance for craftsmen and in the best case to form a symbiosis (Inga et al., 2023) between the human worker and those tools, it is necessary to investigate the challenges and advantages of hand-arm vibration on cognition in a first step. However, so far there exist only few studies investigating the impact of hand-arm vibration on cognitive processes. The present study presents a first systematic investigation of the impacts of perceived hand-arm vibration on cognitive control. We compare the performance in a Flanker task of two conditions in which participants experience hand-arm vibration (either in random or in constant frequencies) while conducting the task to a control condition without hand-arm vibration. Both, the challenges as well as the advantages of the experienced hand-arm vibration on cognitive processing are going to be discussed.
Keywords: hand-arm vibration, cognitive performance, cognitive control
Presentation type: Oral presentation / Talk
Session: Experimental Engineering Psychology and Human Factors I

The Cognitive Foundations of Stereotype Threat: A Diffusion Model Analysis

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The activation of negative stereotypes can reduce the performance of group members in a test situation. This phenomenon has been referred to as stereotype threat. Although the effect has been frequently replicated, the cognitive basis remains unclear. Different theoretical explanations are based, for example, on a lower motivation of the threatened group (e.g., because the expectation to perform excellently is compromised) or on an increased working memory load due to stereotype-related thoughts. To disentangle the several possible explanations, data of 300 women from an online study on stereotype threat were entered into a diffusion model analysis. In this study, participants had to estimate whether the arithmetic mean of 16 simultaneously presented numbers was above or below 500. Before the experiment began, half of the participating women were told that the study was about gender differences, while gender was not mentioned for the remaining participants. The results show an increased number of errors in the stereotype threat condition. The diffusion model analysis suggests that this effect is due to liberal threshold settings, hat is, a focus on speed rather than accuracy. Possible relations to a promotion focus orientation are discussed.
Keywords: stereotype threat; diffusion model; regulatory focus
Presentation type: Oral presentation / Talk
Session: Social Psychology

Contextual Facilitation of Neural Processes Underlying Action Recognition

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The co-occurrence of objects and actions in scenes of our daily life allows our brains to build and rely on associations for action recognition, especially when information is scarce (Wurm et al. 2017). These associations are thought to be conveyed by top-down projections facilitating recognition (Bar 2007). Several studies examined the interplay between actions, objects, and scenes during action recognition (Wurm et al. 2012; Wokke et al. 2016; Baldassano et al. 2017). However, we still have a limited understanding of the neural mechanisms through which context contributes to action recognition. To shed light on this question, we designed a paradigm for an fMRI experiment in which we manipulate the amount of contextual information, by segmenting backgrounds or manipulated objects out of action scene images. To assess the impact of contextual facilitation on action recognition, we will compare decoding accuracies from partially segmented action scenes to those obtained on full action scenes. We expect to find contextual facilitation for actions as a super-additive enhancement of action representations in fully compared to partially presented action scenes. Additionally, we will test whether multivoxel fMRI activation patterns evoked by full action scenes are resembled by weighted averages or sums of patterns evoked by isolated constituent components. We expect the representation of the full action scene to be better modelled by a weighted pattern average evoked by constituent components. The results of this experiment are expected to contribute to our understanding of the way in which we extract the action meaning from multiple different sources.

Keywords: actions, contextual facilitation, fMRI, MVPA
Presentation type: No-Data Poster
Session: Perception III

The role of postural demands on tactile perception in the young and the elderly

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Predictions of future sensory states shape perception and action. On moving limbs, the tactile signals are down-weighted likely due to sensory predictions matching the actual sensory feedback. When tactile feedback processing demands are high, e.g. when grasping a slippery object, predictive weights decrease to favor sensory sampling. Contrary to these results, we recently found hampered sensory processing in standing than sitting, i.e. in situations with high feedback processing demands. To explore the role of feedback processing demands on tactile perception, we investigated how postural demands modulate tactile perception on the lower limb and how these effects change in old age when reliance on predictions increases.
The participant's task was to detect a brief vibrotactile stimulus (50 ms) of different intensities on their calf while fixating a visual target on the wall. They performed three conditions: sitting (baseline), standing, and standing on foam. For the latter two conditions, participants stood on a force plate which was used to quantify their center of pressure behavior indicating postural demands. We estimated detection thresholds via psychometric function fitting and normalized the two standing conditions to their perceptual results in the sitting condition.
Our preliminary results show that posture was less stable and tactile perception poorer when standing on unstable than stable surfaces, independent of age. Additionally, older compared to young adults showed generally poorer tactile perception in all conditions. Overall, tactile feedback signals are down-weighted when postural demands increase in stance retention, probably due to shifting processing capacities to the more important task.
Keywords: Perception & Action, Postural Control, Sensory Predictions, Tactile Attenuation, Aging
Presentation type: Oral presentation / Talk
Session: Crossmodal Perception / Synesthesia

Mechanisms of biased memory in the context of shared reality creation

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A bulk of empirical evidence shows that episodic memory is susceptible to social influence. This influence can be exerted not only intentionally by social agents; it can also emerge incidentally in interpersonal interaction and communication, without any intention or explicit awareness of the participating actors. We argue that such memory biases are often the joint product of cognitive processes and people's needs and motives. For this purpose, we present recent empirical results from the so-called „saying-is-believing" (SIB) paradigm, in which episodic memory retrieval of a communicator is biased in the service of shared reality creation with his/her audience. In this experimental paradigm, a communicator first reads a text describing ambiguous behaviors of a target person (called Michael) and then describes this person in a personal message to an audience, after having learned that this audience knows Michael and either likes him or does not like him. Finally, the communicator is asked to recall the original text about Michael. The critical finding is that not only the communicator's message valence is biased towards the audience attitude, but – more importantly – also his/her individual episodic memory of the original information about the target person. The memory effect does not occur when a biased message is produced due to other motives than shared reality creation (e.g., financial incentives). Our most recent findings show, by including a newly developed speeded reaction time task, that the memory bias is cognitively rooted in enhanced accessibility of audience-congruent information about the target.
Keywords: episodic memory, recall bias, shared reality, social influence, cognitive accessibility
Presentation type: Oral presentation / Talk
Session: Collective remembering: Social processes and the representation of public events in human memory

Interpersonal coordination in joint multiple object tracking

Basil Wahn
Ruhr University Bochum

People often perform visual tasks together, for example, when looking for a misplaced key. When performing such tasks jointly, people tend to coordinate their actions to divide the labor, for example, by looking for the misplaced key in different rooms. This way, they tend to perform better together than individually — they attain a group benefit. In this talk, I will present a series of studies, in which we investigated interpersonal coordination in a joint multiple object tracking task. I will address how group benefits can be quantified, whether group benefits are attained or not, how labor divisions come about, and which factors influence group performance.
Keywords: Social Cognition, Joint Action, Interpersonal Coordination, Collective Benefit, Multiple Object Tracking
Presentation type: Oral presentation / Talk
Session: Better together? Benefits and costs of joint action

Automatic cars as role models for human drivers? A driving simulator study

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At some point in the future, it might be common to see automated vehicles driving next to human drivers on public roads – in so-called mixed traffic. One arising question regarding mixed traffic considers the influence automated vehicles will have on the traffic system. The expected effects of AVs range from a better traffic flow to overall more safety due to AVs rule-compliance.
Another possible impact of AVs on traffic is almost not discussed yet: The influence that AVs might have on human drivers (HDs) through imitation learning. Therefore this project investigates possible role model effects from AVs to human drivers.

A simulator experiment is being conducted, where the participants are driving in a city environment. The participants stop at a stop sign at a junction, where ten role model cars cross. Following the Social Learning Theory, the participants (observers) are being exposed to the presented behaviour of those role models with the intent to make the observers copy the observation.

To check the hypothesis the models' behavior is being varied in 15 scenarios. The variation occurs in the distances the model cars are keeping (small, optimal, large) and their driving modes (AC or HD).
The measured variable is the distances the participants keep after the observation phase.

The results suggest that observed driving behaviour influences human drivers' driving style. However, the influence doesn't occur through direct imitation of the observed behaviour. Both, very large presented distances and very short distances lead to larger distance keeping behaviour in human drivers.
Keywords: Automated Driving, Autonomous Driving, Automation, Traffic Psychology, Role Models, Driving Simulator Study
Presentation type: Oral presentation / Talk
Session: Traffic Psychology I: Human behavior and traffic safety

Influence of non-contingent reward as a proxy for UBI on task switching in a self-organized task switching experiment

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In cognitive psychology, numerous studies examined the effects of reward on task-switching behavior (e.g. Fröber & Dreisbach, 2016b, 2021; Fröber et al., 2018, 2019; Jurczyk et al., 2019, Kleinsorge & Rinkenauer, 2012). Usually reward was given contingent on performance, i.e., it was only granted when responses have been correct and fast. Non-contingent reward is often neglected, and only a few studies have focused on its effect on cognitive processes (e.g. van Steenbergen et al., 2009, 2012; or Fröber & Dreisbach, 2014, 2016a). Results in these studies diverge probably due to differential effects on specific processes and we thus consider it important to look into this topic in more detail.

In the current experiment, we investigate the effects of non-contingent reward on task selection and task performance in a self-organized task-switching experiment where participants choose between a number and a letter task. With each consecutive task repetition, the waiting time for the stimulus for the task repetition increases. Importantly, participants balance switch related (switch costs) and repetition related (waiting time) temporal costs deciding for task switching when switch cost and waiting time are quite similar (Mittelstädt et al., 2018). We compare task switch rates, switch costs and the balance of temporal costs - depending on whether a non-contingent reward or no reward was provided in the previous trial. We conjecture that the impact of non-contingent reward might differ for participants, therefore we add "subject" as a second-level factor in the linear mixed models, with which we plan to analyze the data.

Keywords: self-organized task switching, non-contingent reward, flexibility, stability
Presentation type: No-Data Poster
Session: Cognitive Control and Conflict I

Unveiling the Speed-Accuracy Tradeoff: A Novel Perspective through the Ornstein–Uhlenbeck Model

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LMU Munich

We addresses the longstanding issue of the Speed-Accuracy Tradeoff (SAT) in decision-making processes by introducing an alternative theoretical framework. Traditional models, such as the Diffusion Decision Model (DDM), have often relied on manipulating the decision threshold to explain SAT, but inconsistent findings have prompted a reevaluation. Pitfalls in previous research highlight the need for alternative approaches. This paper explores the Ornstein–Uhlenbeck Model (OUM), which introduces a unique self-excitation parameter influencing the drift rate, offering a novel perspective on SAT. Unlike DDM, OUM maintains a fixed boundary separation parameter across conditions, emphasizing the role of self-excitation in shaping decision dynamics. The article compares DDM and OUM using various datasets, conducts model comparisons, and employs cross-fitting methods to explore their relationships and parameter identifiability. By proposing a new theoretical model and systematically examining its performance, this paper contributes to the ongoing discourse on the mechanisms underlying SAT in decision-making processes.
Keywords:
Presentation type: Oral presentation / Talk
Session: Drift Diffusion Modeling

Arousal cues induce visual perceptual learning (VPL) of a salient but task-irrelevant visual feature

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Visual perceptual learning (VPL) does not occur when a salient visual feature is exposed in a task-irrelevant manner. To test whether elevated arousal levels can affect the VPL of salient and task-irrelevant visual features, we trained two participant groups (Arousal – AG – and Control – CG – groups) over the course of 5 daily sessions on a contrast categorization task. Participants categorized a Gabor patch (one of 6 contrasts), presented in the upper left or lower right visual quadrant into high- or low- contrast subsets. The Gabor had two orientations (2.5o left or right tilted from vertical), counterbalanced across the contrast levels. The orientation of the Gabor was salient but task irrelevant. Unbeknownst to the participants, an arousing soundbeep was paired with one of the orientations (the paired orientation) with 80% likelihood in the AG, while no beep was provided in the CG. Participants' fixation stability and pupil diameters were monitored throughout the training sessions to ensure that the beep successfully induced an increase in their arousal levels. To test whether VPL occurred for the task-irrelevant orientation visual feature, participants performed an orientation discrimination task for different contrasts in both quadrants before and after the training sessions. While there were no performance changes in the CG, performance improved for both the orientations in both visual quadrants for AG. Our results suggest that elevated arousal levels can induce generalized VPL of a salient visual feature, the learning of which would be otherwise suppressed if only exposed in a task-irrelevant manner.
Keywords: Visual perceptual learning, Arousal, Plasticity, Visual perception
Presentation type: Oral presentation / Talk
Session: Perceptual Learning

Comparing Remembered and Imagined Collective Events Across Early and Late Phases of the COVID-19 Pandemic: A Multinational Study

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This study investigates how the pandemic and related lockdown experiences influence memory and future forecasting of collective global and national events across 10 countries. The presentation will examine the themes and phenomenology of events reported across two time points (spring 2021) and (autumn 2022) during the pandemic with independent participant samples. The results demonstrate that while Covid-related events dominated past and future thinking during the early phase of the pandemic, the frequency of these events reduced substantially during the later phase of the pandemic. In line with ongoing global threats, increases were observed in the frequency of non-covid related political events across all conditions. Non-covid related events related to war were more frequent in the global event condition and non-covid related events focusing the environment were more frequent in the future event condition. Preliminary analyses also suggest that future events were rated as less negative than past events across both early and late phases of the pandemic. However, differences were observed in the valence of future events when comparing early and late pandemic phases. More specifically, events reported during the late phase of the pandemic were more negative compared to the early phase and this difference was strongest in the global event condition. Findings suggest that the phenomenology and themes of collective events reported at different times during the pandemic reflect ongoing changes in national and global socio-cultural contexts and will be discussed in relation to current models of collective event representation.

Keywords: Collective Memory, Future thinking, Pandemic, Thematic coding, National, Global
Presentation type: Oral presentation / Talk
Session: Collective remembering: Social processes and the representation of public events in human memory

Development of accidents with vulnerable road users over time

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While the proportion of car users in road accidents resulting in personal injury has decrease in recent years, the proportion von vulnerable road users has increased [1]. The largest increase was recorded among cyclists.

This increase can also be seen in the distribution of the accidents that are reported by the police to the Audi Accident Research Unit (AARU). AARU is a cooperation between the Regensburg university medical center and AUDI AG. AARU analyzes traffic accidents in an interdisciplinary way with the aim of learning from accidents. Although the AARU data is not representative, it does provide a deeper insight into the traffic accidents that were investigated in more detail.

The AARU has now analyzed more than 1,600 road accidents. These are mainly accidents involving passenger cars only. However, a good 10% of the accidents involved vulnerable road users. Looking at the causes of accidents, which were assigned according to the 5-step method [2], for this part of the analyzed accidents, the distribution of the causes of accidents shifts. Although the most frequent category continues to be the information reception, the areas of information access and objective become more important in accidents involving vulnerable road users.

[1] Destatis (2023). *Verkehrsunfälle.* https://www.destatis.de/DE/Themen/Gesellschaft-Umwelt/Verkehrsunfaelle/_inhalt.html#sprg478574
[2] Weber, S., Ernstberger, A., Donner, E. & Kiss, M. (2014). Interdisziplinäre Unfallforschung – ein Zusammenschluss von Technik, Medizin und Psychologie zur Steigerung der Verkehrssicherheit. *VKU Verkehrsunfall und Fahrzeugtechnik, 52* (2), 61-65.

Keywords: traffic accident, accident research, vulnerable road users, accident causation, 5-step method
Presentation type: Oral presentation / Talk
Session: Traffic Psychology I: Human behavior and traffic safety

Who said what? How language experience influences item and source memory

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In a series of experiments, we investigated how well native and non-native participants can remember what was said (item memory) and who said it (source memory). The ability to remember a particular piece of information and also from whom this information was obtained can be critical, for example, for continuing a conversation where it left off, for making an informed judgment about the information's credibility, or even for predicting what a speaker might talk about next. However, due to attentional demands, the ability to encode such item-speaker associations may vary with language proficiency. In our experiments, native and non-native participants first heard two speakers refer to individual objects before they had to remember which objects had been mentioned (item memory) and/or who had previously named them (source memory). Visual objects had either a prototypical color (e.g., green broccoli) or were images typical for a specific speaker age (e.g., a children's shovel). Speakers either consistently named objects of one color or objects matching their age, or they randomly named objects. While both participant groups in the color experiment associated objects with speakers successfully, a consistent pattern for item-speaker associations facilitated encoding only for native participants, while non-native participants had no such memory advantage. We will discuss in how far differences in pattern consistency and memory type can vary with language proficiency and participants' ability to attend to aspects of the L2.

Keywords: source memory, item memory, item-speaker association, non-native participants
Presentation type: Oral presentation / Talk
Session: The Impact of Language Experience on Learning and Memory

Masking Diagnostic Facial Features Disrupts the Categorization of Emotion Expressions

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Different expressions of emotion can be recognized by unique combinations of facial features. Studies usually ask observers to either inspect full faces, measuring which face parts are being explored, or they use masked faces and measure how performance changes when different face parts are visible.
We linked these two approaches by first asking 202 observers to highlight the most informative parts of a full face for each expression. Then, we generated masked faces, where only these highlighted parts were visible. A new group of 201 observers had to recognize each expression in the masked faces, with masks being either matched (e.g. happy face/happy mask) or mismatched (e.g. disgusted face/angry mask).
When mask and expression matched, recognition accuracies for all expressions remained high (e.g. 99% for both full and masked happy face). When expression and mask were mismatched, performance dropped sharply. When using a happy mask on other emotions, they were systematically mistaken for neutral, with e.g. 86% neutral ratings for surprised expressions. For the other emotions, confusions were often biased towards the mask (e.g. disgust was mistaken for anger in 75% of cases when using an anger mask).
These results are in line with happiness engaging unique features of the face, while the other emotions engage sets of partly overlapping features, causing the masking manipulation to amplify confusions which observers already make in fully visible faces. Using the results of one study to generate stimuli for another study allows us to integrate two main approaches of face expression research.
Keywords: faces, facial expressions, emotions, categorization, masking, vision, perception
Presentation type: Oral presentation / Talk
Session: Facial Expressions I

CANCELLED - Consequences of prefrontal brain stimulation on impulsivity – a simultaneous HD-tDCS-fMRI study

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High-definition transcranial direct current stimulation (HD-tDCS), a non-invasive brain stimulation technique to alter cortical excitability, presents a powerful tool to modulate brain activation associated with response inhibition. However, previous research has yielded inconclusive results of stimulation effects on impulsivity. Hence, it is essential to better understand the underlying mechanisms in order to delineate factors that influence responsiveness to (HD-)tDCS.
In a double-blind, placebo-controlled simultaneous HD-tDCS-fMRI study, 45 male chronic tobacco users (TU) and 45 non-smoking male participants (non-TU) performed the Stop Signal Task before and after sham tDCS or 20 minutes of 1.5mA anodal HD-tDCS over the right inferior frontal gyrus during resting-state fMRI.
Behavioral data revealed significant improvements in Stop Signal Reaction Times (SSRTs) following active and sham stimulation in non-TU. TU showed improved SSRTs following sham but not active stimulation.
Results further highlighted significant variability in HD-tDCS-induced electric fields (EFs). Seed-to-voxel analysis indicated increased resting-state functional connectivity (rsFC) under the anode, particularly to the left prefrontal cortex, in active compared to sham stimulation during initial stimulation periods and post-stimulation.
Collectively, our findings suggest that the enhanced SSRTs are primarily attributed to a training effect, rather than being influenced by HD-tDCS. This contradicts many studies using conventional tDCS set-ups reporting improved response inhibition following anodal prefrontal tDCS. In TU, anodal HD-tDCS even seems to suppress the training effect. Considering the high variability of EFs, our study highlights the importance of taking individual differences into account when assessing the impact of HD-tDCS, urging further investigation in this domain.

Keywords:
Presentation type: Oral presentation / Talk
Session: Modulation of Impulsive Choice and Impulsive Action

Primacy effects during performance monitoring of environment-based cognitive strategies

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Humans frequently make use of their environment when acquiring and processing information. For example, humans retrieve factual knowledge not only from their own organic memory but also from their handwritten notes, sometimes from their colleagues, from the books they studied the facts with in the first place, from search engines, and so on. Clearly, it is a challenge to proficiently navigate the plethora of cognitive strategies available in today's technologized world. Here, we took a look at a mechanism that contributes to such proficiency: performance monitoring. Specifically, we took a look at the time course of speed monitoring. Is speed monitored consistently across all encounters with a cognitive strategy? To answer this question, we subtly manipulated the time it took two algorithms to find the solution to Trivia questions in a forced-choice observation block and subsequently asked participants to use the algorithm they prefer in a free-choice block. Crucially, some algorithms performed faster at the beginning and some at the end of the forced-choice observation block. Across a series of experiments, our results clearly show a preference for algorithms that performed fast in the beginning of the observation block. Results showed no preference for algorithms that performed fast at the end of the observation block. Thus, we found evidence for a primacy but no evidence for a recency effect. In other words, performance monitoring might be focused on initial encounters of novel cognitive strategies and be less pronounced thereafter.

Keywords: Performance monitoring; cognitive strategy selection; cognitive offloading; problem solving
Presentation type: Oral presentation / Talk
Session: Metacognition and Problem Solving

CANCELLED - Exploring the dual-task structure of report-based paradigms in the study of unconscious processing

Charlott Wendt, Prof. Dr. Guido Hesselmann
Psychologische Hochschule Berlin

One commonly used paradigm to investigate the scope and limits of unconscious processing is the masked priming paradigm. The concept of this paradigm is that the prime stimulus facilitates or inhibits a speeded reaction to the target stimulus even when the prime was not consciously perceived. The prime's visibility is typically assessed with a subjective or objective measure on a trial-by-trial basis. Our study started from the observation that these report-based paradigms qualify as dual-tasking situations. Recent work has shown that semantic as well as response priming effects are affected by dual-tasking costs. In our study, we aimed to systematically estimate the influence of dual-tasking costs on masked response priming effects. In a small-N within-subject experiment using metacontrast masking, participants discriminated the target by quickly pressing one of two keys, and then indicated the subjective visibility of the prime stimulus, either by vocal response or by key-press (factor "response modality"). The subjective measure consisted of a perceptual awareness scale (PAS) with either two or four items (factor "task complexity"). We predicted a combined effect of both factors on the extent of response priming, i.e., an interaction between the demands of the prime- and target-related tasks at the motor execution stage and the central processing stage. Preliminary data show more dual-tasking costs in form of increased reaction times for the manual response modality conditions as well as for the higher task complexity conditions. Based on our data, we will formulate recommendations for masked priming paradigms involving dual-tasking situations.

Keywords: unconscious priming, metacontrast masking, dual-tasking perspective, response modality, task complexity
Presentation type: Poster Presentation
Session: Cognitive Control and Conflict II

Task-specific response reversal increases task switch costs—despite long preparation time and post-reversal practice

Mike Wendt
Medical School Hamburg

Task switch costs (i.e., worse performance when a task is executed after a trial featuring a different task than after a trial featuring the same task) are attributed, in part, to proactive interference resulting from previous processing of the current stimulus in a competing task (i.e., the task switched from). Such stimulus-specific proactive interference may also occur, however, when a current stimulus was presented in a previous task context distinct from the tasks administered in the current switching procedure. To investigate the effect of stimulus presentation in a previous task context, participants switched between tasks afforded by distinct sets of stimuli (i.e., "single-affordant" stimuli) and underwent reversal of the stimulus-response assignment in one of the tasks after a first phase of the experimental session. The reversal increased task switch costs in the task subject to the reversal undiminished by lengthened preparation time (although longer preparation time reduced both reaction time in general and the switch cost). These results demonstrate that stimulus-specific proactive interference affects task performance more strongly in switch trials than in repetition trials and is not reduced by task preparation (thus contributing to the residual switch cost). The reversal-induced component of the task switch cost remained substantial during the remainder of the experimental session. By contrast, performance in the other (unaltered) task suffered only temporary (task sequence-unspecific) impairment, suggesting general processing impediment induced by acute relearning demands.

Keywords: task switching, reversal learning, task preparation
Presentation type: Poster Presentation
Session: Cognitive Control and Conflict I

Increased representational stability with motor sequence learning in children and adults

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In the course of development children acquire various skills such as playing the piano or riding a bike. In adults, the early phases of learning are characterized by engagement of the prefrontal cortex (PFC) reflecting high control demands as strategies and new routines need to be established. We used fMRI to examine how the protracted development of the PFC contributes to age differences in motor skill learning between children (7 - 10 years) and adults. In an associative visuo-motor learning task, participants learned different sequences by repeatedly practicing them. During the early phases of learning, both children and adults showed enhanced PFC engagement. In contrast, in the late phases of learning both groupd showed greater engagement of the right motor cortex. However, the increase in activity over the course of learning was greater for adults compared to children. Representational similarity analyses revealed that the neural representations of the sequences became more similar with learning in both groups. In motor regions, representational stability increased similarly for children and adults, whereas in the PFC children showed less pronounced effects of learning than adults. These results suggest that ongoing development in control and representational systems contribute to motor sequence learning in childhood.

Keywords:

Presentation type: Oral presentation / Talk

Session: Changes for learning: how do changes in task-specific representations shape adaptive cognitive control?

Linking brain maturation and memory development in early and middle childhood

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Adaptive memories are formed in the face of a fundamental tension: extracting commonalities across experiences to generate novel inferences (i.e., generalization) while simultaneously forming separate representations of similar events (i.e., memory specificity). During childhood, this tension is amplified through the uneven progression of generalization and memory specificity. In particular, it is not well understood how children manage to consolidate both generalized and specific memories. Computational memory models suggest that specific experiences are initially encoded as hippocampus-dependent episodic memories and slowly become amenable to generalization through consolidation – typically facilitated by post-learning sleep.
In a series of studies, we aim to delineate the ontogeny of memory specificity and generalization across development in early middle childhood. Specifically, we test the conjecture that the uneven maturation of intra-hippocampal structures is longitudinally linked to the late emergence of memory specificity during childhood. Moreover, we ask the question in how far sleep-dependent memory consolidation amplifies the reliance on fast generalization in early childhood at the expense of memory specificity.

Keywords:
Presentation type: Oral presentation / Talk
Session: Advances in Developmental Cognitive Neuroscience

The facilitating effect of redundant linguistic labels on concept formation: The role of valence

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University of Tübingen

Does language influence non-linguistic cognitive processes, and if so, how? Previous research supports its suggested influence, for example showing that linguistic labels facilitate concept formation even when they are redundant (Lupyan et al., 2007). In two experiments, we replicated the facilitatory effect of redundant labels using a new stimulus set, and then investigated whether valence plays a role in these findings.
In training, participants in two experiments learned to categorize two types of fish by moving a diver towards or away from the respective fish types. Auditory feedback was given after each trial. The label group received a linguistic label after the feedback ("Libach" vs. "Wonter"), whereas the no-label group did not receive the labels. In Experiment 1 (the replication) the two categories differed in valence (dangerous vs. harmless) whereas in Experiment 2, any contributions of valence were largely prevented via the task framing (fish swimming with or against the current).
The label group outperformed the no-label group in both experiments, showing faster and better concept learning in the training phase and increased categorization performance directly after the training phase and a day later.
These results thus replicate the finding that redundant linguistic labels facilitate category learning, while showing that this effect is not reliant on contexts in which the categories contain valence, providing evidence that further underlines the influence of even redundant language on non-linguistic cognition.

Lupyan, G., et al. (2007). Language is not just for talking: Redundant labels facilitate learning of novel categories. *Psychological Science, 18*(12), 1077–1083.

Keywords: categorization, redundant labels, valence
Presentation type: Poster Presentation
Session: Memory and Learning II

How do adverse weather conditions affect pedestrians‘ time-to-collision judgments?

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In fog, it is challenging to detect approaching vehicles, which may lead to risky pedestrian behavior. Previous studies have reported that in comparison to clear weather, fog produced greater distance and time-to-collision (TTC) estimates. However, these studies did not control the detectability of targets in fog. Thus, this effect could have been caused by contrast reduction of a visible target or by belated coming into view of an initially invisible target.
In two TTC experiments, we sought to disentangle whether contrast reduction or late visibility drive the overestimation of TTC in fog. Using a VR prediction-motion paradigm, participants estimated TTCs for vehicles approaching them at different constant velocities in clear and foggy weather. The vehicles remained visible until occlusion. Experiment 1 (n=20) revealed no significant main effect of the weather condition. In Experiment 2 (n=19), we additionally presented the vehicles in clear weather but such that all vehicles only came into view at distances of 41 m or less. Again, fog did not significantly increase TTC estimates, but participants estimated the TTC to be significantly longer when the visible portion of the car’s trajectory was shortened.
Our findings suggest that observers benefit from a larger spatio-temporal window when judging the TTC of an approaching object. The detrimental effect of fog may be reduced to this effect. Further research is needed to identify the interplay between contrast reduction and the spatio-temporal window.

Keywords: time-to-collision estimation, fog, traffic, virtual reality
Presentation type: Oral presentation / Talk
Session: Traffic Psychology II: Perceptual aspects

Response inhibition for the basketball pump fake

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Paderborn University

Surprisingly, even NBA players fall for pump fakes in approximately 73% of the time and initiate erroneous blocking movements (Meyer et al., 2022). To investigate the point where inappropriate defensive movements can no longer be inhibited, Slater-Hammel's (1960) paradigm was modified to construct a basketball-specific anticipation-response task. To this end, 22 participants (8 female and 14 male, 21.8 years old) watched a video of a basketball jump shot (frontal perspective) and were asked to release the space bar at the point when the ball leaves the player's fingertips (go-trials). In 25% of all trials a pump fake was shown, where the player stopped the throwing action prematurely, paused for 50 ms, and moved the ball back to the initial position at hip height (stop-trials). For these stop-trials, participants were instructed to inhibit their responses. Using a stair-case algorithm, the point-in-time when the jump shot was stopped was adjusted in a way that participants' inhibition rate was at 50% (reflecting the so called "point-of-no-return", PNR). The entire experiment consisted of three blocks of 200 trials each. The PNR was located 178 ms before the point of ball release. Participants delayed their responses after stop-trials in a subsequent go-trial, regardless of whether participants were able to suppress their response [$F(2, 42) = XX$, $p < .001$; $\eta p2 = .729$], which reflects strategic post stop-trial adjustments. In addition, practice effects were found, showing an improvement of precision for go-trials across blocks [$F(1.151, 24.177) = 7.897$, $p = .008$; $\eta p2 = .273$].

Keywords: response inhibition, basketball, deceptive actions, anticipation skills, motor control
Presentation type: Oral presentation / Talk
Session: Cognitive Effort

Bottom-up and top-down mechanisms involved in the perception of robot faces

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Robot faces often differ from human faces both in terms of their facial features (e.g., lack of nose or eyebrows) and spatial relationships between these features (e.g., disproportionately large eyes). This can influence the degree to which brain areas involved in face processing (e.g., Fusiform Face Area) process them as face-like in a bottom-up manner. At the same time, it is possible that believing that a face stimulus represents a human versus an artificial agent (e.g., robot or deepfake) might impact face-typical processing in a top-down manner. Processing robot faces in a less face-like manner than human faces could undermine human-robot interactions because humans could fail to perceive robots as individuals with unique capabilities – a phenomenon known as outgroup homogeneity – potentially leading to miscalibration of trust and errors in allocation of task responsibilities. In two experiments, we use the face inversion task to examine whether face processing differs between human and robot stimuli: if robot faces are perceived as less face-like than human faces, the inversion effect (i.e., difference in recognition performance for faces presented upright versus invertedly) should be less pronounced for robot than human faces. Experiment 1 shows that robot faces induce smaller inversion effects than human faces in a bottom-up manner: the more human-like facial features robots possess, the larger the inversion effect. Experiment 2 shows that inversion effects for actual human faces are attenuated in a top-down manner when participants believe that the depicted stimuli are android robots rather than human agents.

Keywords: social cognition, face perception, human-robot interaction, artificial agents, top-down modulation
Presentation type: Oral presentation / Talk
Session: Facial Expressions II

The effect of stimulus resolution and object content on human scene categorization

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Human scene categorization is a remarkably fast and effortless process. Object- and scene-centred theories propose that scene categorization is based on object information and global scene properties, respectively. Here we tested scene-centred theories by having participants perform a 16AFC scene categorization task using scene textures as stimuli that are meant to reproduce global scene information. Additionally, we manipulated the spatial resolution of the reproduced information by varying the size of the image areas from which global information was extracted. Our results show that a resolution of 5x5 image areas was sufficient for above-chance categorization, but a higher resolution was required for indoor compared to outdoor scene categorization (10x10 vs. 5x5). In exploratory analyses, we further related human scene categorization accuracy to classification performance of a computational classifier trained on global scene properties and different measures of object content (e.g., number and size of objects) in the base stimuli. Interestingly, human scene categorization accuracy was best predicted by the number of objects in a scene (inverted) and their average size. The scene categories with the highest average categorization accuracy were those typically containing fewer and larger objects (e.g., mountains) as compared to many and smaller objects (e.g., restaurants). The current results are in line with previous findings from our lab suggesting that global scene information is not sufficient to explain human scene categorization. Instead, object information seems to be used for human scene categorization even in experimental conditions biased towards processing of global scene properties.

Keywords: scene categorization, objects, global scene information, textures
Presentation type: Poster Presentation
Session: Perception III

The Threat of Powerlessness: Consequences for Affect and (Social) Cognition

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Powerlessness co-occurs with detrimental societal phenomena such as heightened conspiracy beliefs and perceived ingroup homogeneity and commitment, as well as increased conviction about one's own opinions and worldviews. In four studies, we tested whether a causal relationship between these phenomena and powerlessness exists. Furthermore, we suggested and examined a possible motivational mechanism that would explain this relationship.
In detail, we propose that the presence of powerlessness constitutes an aversive state that first triggers the behavioral inhibition system (BIS). In line with the General Process Model of Threat and Defense (GPMTD, Jonas et al., 2014), the BIS then causes the emergence of threat defenses which are capable of palliatively lowering BIS activation while reinstating the behavioral activation system (BAS). According to the GPMTD, these threat defenses should entail the phenomena shown to be associated with powerlessness (e.g., conspiracy beliefs, ingroup homogeneity, etc.)
To test these hypotheses, one correlational and three experimental and preregistered studies were conducted. Results confirmed the hypothesized direct link between powerlessness and BIS activation as well as the indirect link between powerlessness and threat defenses via BIS activation. Contrary to predictions, though, no direct link between powerlessness and threat defenses emerged.
The present research sheds light on the consequences of the understudied state of powerlessness. It furthermore suggests a motivational mechanism explaining why powerlessness can lead to these consequences.

Keywords: powerlessness, behavioral inhibition, psychological threats, threat defenses, conspiracy beliefs, anxiety
Presentation type: Oral presentation / Talk
Session: Social Psychology

The Sound of Recall: Cognitive and Meta-cognitive Markers of Memory Retrieval Performance in Speech

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Cognitive models of memory retrieval have been applied in learning systems that aid in memorizing information by adapting to the needs of individual learners. More specifically, such systems present retrieval questions of appropriate difficulty to learners to help them memorize factual information like vocabulary or glossary items. To estimate appropriate item repetition schedules, traditional learning systems use accuracy and response times as behavioral proxies of memory strength. Here, we focus on spoken responses to visually presented retrieval cues. In two experiments, we analyzed over 10,000 utterances and demonstrate that it is possible to extract information about (a) the accuracy of a response, and (b) a speaker's subjective confidence in a response, from prosodic cues in the speech signal. Furthermore, we show that a learner's meta-cognitive beliefs about memory performance are reflected mainly by variations in pitch and speaking speed, whereas the objective accuracy of the response is mainly related to its loudness. Fundamentally, these results contribute to a better understanding of the relationship between prosodic speech variations and (meta)memory processes, and could facilitate the development of speech analyses as a tool in learning research. Practically, they can improve models of memory retrieval used in adaptive learning systems. For example, extracting information about a speaker's confidence from the speech signal in real time may allow for improvement of predictions of future retrieval success—without the learner having to make explicit confidence judgments after each learning trial.
Keywords: Adaptive learning, cognitive modeling, confidence, metacognition, prosody, speech
Presentation type: Oral presentation / Talk
Session: Enhancing Learning and Memory

The role of task sets in implicit learning: Cross-dimensional sequence learning of colors and shapes

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Implicit learning is thought to be one basic learning mechanism, taking place without conscious awareness about the fact that one learns or what one learns. Implicit learning is assumed to occur in distributed sets of encapsulated, specialized, and parallel working modules. However, it is not clear yet what exactly is processed in these modules. While there is ample evidence for a distinction between modalities (e.g., visual, auditory perception), the representational content of the modules might even be distinguished by features within the same modalities (e.g., color, and shape within the visual modality). One way to distinguish between these views is to study cross-modal learning (e.g., learning of a color-shape sequence within the visual modality). According to modularized theories, the encapsulated modules might not exchange their sequence knowledge which would prevent cross-modal learning if the modules process single features. Indeed, we showed in Experiment 1 that participants did not learn a cross-modal sequence of colors and shapes (e.g., red – blue – triangle) but an abstract sequence of categories (e.g., color – color – shape). An alternative assumption is that participants did not learn cross-modal transitions because the task set in implicit learning tasks might stress the unimodal transitions. In Experiment 2, we stressed the importance of cross-modal sequence transitions in an induction phase. The findings showed that the task set influenced whether the participants learned the concrete or the abstract cross-modal sequence. We conclude that implicit learning is based on the processing of features and the current task set.

Keywords: implicit learning, cross-dimensional learning, task set, intentional weighting
Presentation type: Poster Presentation
Session: Cognitive Control and Conflict II

The Impact of Response Selection Demand on Language-Space Compatibility Effects

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To examine the assumptions of the embodied account of language comprehension, many studies make use of behavioral paradigms involving basic compatibility effects. The literature shows that these compatibility effects can be modulated significantly by experimental features. Using a Stroop-like language-space compatibility effect, we investigated the influence of the demand of the response selection stage on the size of the compatibility effect. We successively reduced the demand of the response selection in three experiments. Across all experiments, words associated with a position in vertical space (up vs. down) were shown in different font colors. The font color indicated the direction of the response action. Experiments 1 and 2 employed a two-choice response selection (up vs. down response). Experiment 3 reduced the demand in the response selection stage by introducing a go/no-go task, participants were required to either withhold a response or select an upward (or downward, depending on the block) response. A significant compatibility effect was found in Experiment 1 and 2, but not in Experiment 3. This suggests that at least a two-choice response selection is needed to observe a language-space compatibility effect. In a fourth experiment we replicated the results of Experiment 1 and 3, confirming that the nature of the response selection plays a crucial role in the Stroop-like language-space compatibility effect.
Keywords: Embodiment, Language Comprehension, Stroop, Compatibility Effects, Language-Space Associations, Response-Selection Stage
Presentation type: Poster Presentation
Session: Language

Affective evaluation of self-produced action-effect episodes

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Humans and other biological agents seem to be inclined to generate motor activities that result in foreseeable and immediate perceptual effects, although neither the motor activities nor the ensuing perceptual effects themselves appear particularly attractive. While the reasons for this preference are yet unclear, the current research suggests that episodes in which motor activities produce predicted perceptual events come with positive affect. Using affective priming, participante first carried out actions that produced expected or unexpected effects. Shortly after, participants categorized probe words as positive or negative. Results suggest that expected effects come with positive affect and unexpected events come with negative affect, which in turn modulates the performance in the affective probe task. These results scrutinize the role of affective evaluation in the generation of, and possible preference for, specific action-effect relationships, and thus lead to a deeper understanding of how affective and cognitive processes jointly govern action control.
Keywords: action control; affective priming, affect
Presentation type: Oral presentation / Talk
Session: Affect, motivation and control II

Assessing model-based and model-free Pavlovian-instrumental transfer using a novel two-stage paradigm

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Computational approaches to reinforcement learning (RL) suggest that RL happens model-free (MF) via reward prediction errors and model-based (MB) via state prediction errors not only during instrumental (Daw et al., 2011), but also during Pavlovian learning (Schad et al., 2020). Pavlovian-instrumental transfer (PIT) reflects the influence of Pavlovian values on instrumental responses. In single-lever PIT paradigms, which assess the rate of a single instrumental response (Garbusow et al., 2014), PIT effects are often thought to be only MF (Review Cartoni et al. 2016), and they are found to correlate with reduced MB instrumental control (Sebold et al., 2016). However, whether single-lever PIT effects are always MF, or can also be MB, is unclear. Here, we developed a novel two-stage paradigm, designed to assess the contribution of MF and MB control in a single-lever PIT task. While prior tasks have assessed the influences of Pavlovian learning on PIT across blocks of trials, our task assesses this at a trial-by-trial level. We simulated data with a computational dual-control model, assuming separate MF versus MB Pavlovian learning systems. The simulations showed that a two-way interaction (outcome x CS-equality, i.e., whether in a trial the CS was the same in Pavlovian learning and PIT) indicated MF PIT, while a three-way interaction (outcome x CS-equality x transition probability) indicated MB PIT. Preliminary data shows that half of the subjects qualitatively showed MF and MB influences on PIT, in line with Pavlovian learning, and single-lever PIT tasks specifically, involving not only MF but also MB computations.

Keywords: Pavlovian learning, Pavlovian-instrumental transfer, computational modeling, model-free, model-based

Presentation type: Poster Presentation

Session: Memory and Learning III

Promoting Integrity through Simple but Smart Questions

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In professional contexts, employees often encounter challenging ethical and compliance dilemmas that may tempt them towards unethical or illegal behavior. Recognizing this, many organizations now provide employees with "contemplation questions" as decision-making aids (e.g., "Would the public approve of my decision?"). However, the effectiveness of such questions remains largely unexplored. In our project, we use incentivized vignettes to examine the effect of different contemplation questions on ethical decision-making. In Study 1, participants were given either no contemplation question or one of 15 different questions before making decisions in various scenarios. Only a few of the questions demonstrated a positive impact on ethical decision-making, with overall marginal effects. Additionally, no effect differences were found between different categories of contemplation questions or conflict types. In an ongoing follow-up study (Study 2), retaining the vignette structure from Study 1, participants initially make decisions without the aid of contemplation questions. Two weeks later, they are then presented with contemplation questions, where they are asked not only to read but also to respond in order to achieve deeper processing before making a final decision. Furthermore, we examine differences based on the wording of contemplation questions and the number of questions. Results for Study 2 are available in early 2024. The project's goal is to gain insights into the mechanisms underlying the effectiveness of contemplation questions and to develop recommendations for their application, selection, and wording.

Keywords: Ethical decision-making, contemplation questions, compliance and integrity, business ethics, behavioral economics
Presentation type: Poster Presentation
Session: Decision Making

Exploring personal space in human-drone interaction

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As drones become increasingly integrated into our daily lives, it is important to gain a deeper understanding of the dynamics of human-drone interaction. And as drones begin to fly autonomously and to interact with more than one operator or user, personal space requirements and personal space infringements have to be researched. We investigated how the preferred distance between user and drone varies based on the drone's hovering height during interaction. We report two laboratory studies in which we simulated drones in a real-world environment by means of augmented reality.
Our first initial study used a simplified spherical drone model approaching a stationary observer. Results showed that the accepted distance is not influenced by the direction of approach but is significantly affected by the height at which the drone is meant to interact with the participants. In an ongoing second study, we explore the impact of drones of different make and appearance on perceived personal space, as they approach airborne or anchored to the ground surface (similar to a traditional robot). We will present findings from both studies and discuss their implications for designing high-acceptance and user-friendly interactions with drones.

Keywords: human-drone interaction, personal space
Presentation type: Oral presentation / Talk
Session: Experimental Engineering Psychology and Human Factors I

Ordering the Highs and Lows: Age-Effects on the Retrieval of Autobiographical Memories

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The relationship between autobiographical memory and emotion is intensively studied. However, how emotional autobiographical memories (AMs) are retrieved and whether recall processes change across the lifespan have received little empirical attention. Therefore, in the present study, we applied an adult lifespan perspective to examine which retrieval mechanisms are active during the recall of emotional AMs. A total of 364 participants aged between 18 and 89 years recalled up to ten positive and up to ten negative AMs. They provided their age at the time of each event and rated each memory according to its centrality to their identity and life story. Based on linear growth models, we found that the recall of emotional AMs is not only shaped by a chronological recall order; people also tend to order their emotional AMs along the relative importance of AMs by starting with their most central positive, respectively negative memory. Notably, the extent to which AMs show a chronological order effect as well as a centrality order effect varies between individuals of different ages: Whereas the chronological order effect associated with the recall of positive and negative AMs became more pronounced with increasing age, the reversed pattern was found regarding the centrality order effect for negative AMs. Positive AMs were also ordered along their centrality, but the strength of this effect was independent of participants' age. Findings are discussed in terms of potential motivational factors that underly the retrieval mechanisms associated with the recall of positive and negative AMs and age-related differences therein.

Keywords: retrieval mechanisms, chronological order effect, centrality of event, lifespan, positive and negative autobiographical memories
Presentation type: Oral presentation / Talk
Session: Retrieval processes in autobiographical remembering

Gaze Behavior among Older Adults: Exploring Cognitive Processes through a Decision-Making Paradigm and Memory-Recall Task

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Major neurocognitive disorders, notably Alzheimer's disease (AD), pose a substantial societal and economic burden, projecting a significant global healthcare cost. Recognizing the necessity for early detection, this project explores non-invasive tools, such as eye trackers, frequently overlooked in clinical diagnostics **[1]**. The research focuses on understanding cognitive processes by utilizing gaze metrics to distinguish between individuals with healthy cognitive function and those with mild cognitive impairment (MCI). Since MCI lacks sufficient exploration, a comprehensive investigation is vital. Therefore, the project combins two decision-making tasks (*Shopping* and *Liking*) **[2]** and a recall task to study visual scanning patterns in older adults, addressing real-world cognitive challenges. This ongoing study aims to illuminate the pathophysiology of information search processes in older adults with MCI, contributing to enhanced clinical diagnosis and early AD monitoring. As translational clinical practices evolve to incorporate gaze metrics as potential biomarkers, the proposed paradigm holds promise for influencing future healthcare practices. Additionally, it highlights eye trackers as valuable tools, offering practical benefits for routine clinical procedures and supporting traditional diagnostic methods **[3]**.

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[3] Wolf A, Tripanpitak K, Umeda S and Otake-Matsuura M (2023) Eye-tracking paradigms for the assessment of mild cognitive impairment: a systematic review. 10.3389/fpsyg.2023.1197567

Keywords: decision-making, dementia, eye movemnets, eye-tracking, gaze, mild cognitive impairments, older adults
Presentation type: No-Data Poster
Session: Clinical and Biological Psychology

Where does the processing of physical size meet the processing of space?

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The term „spatial-size association of response codes“ (SSARC) effect denotes the observation that people respond more quickly (and accurately) to a small stimulus with a left-hand response, and to a large stimulus with a right-hand response than the other way round. We explored the functional locus of the SSARC effect in two experiments. In Experiment 1, we investigated if the parallel processing of stimulus size and stimulus location can lead to interference (i.e. congruency effects) on a perceptual level of processing. The visual stimuli varied on three feature dimensions (i.e., color, size, location), and participants had to classify each feature in a separate condition. We didn‘t observe a congruency effect between size and location when participants classified color, a condition excluding S-R correspondence effects. In Experiment 2, we investigated if the SSARC effect originates on the same processing stage as the Simon effect, which has been shown to arise at the response-selection stage. The visual stimuli were the same as in Experiment 1, but now participants pressed a left or right key depending on stimulus color, setting the stage for SSARC and Simon effects to occur. An interaction between the two effects would provide evidence for a common origin (i.e. response-selection stage). In fact, we observed an interaction, but only for participants who also showed an SSARC effect in a control condition with central stimulus presentation. In sum, the results suggest that physical size and space interact at the response selection stage, but not at a perceptual level of processing.

Keywords: compatibility; stimulus size; response location; SSARC; functional locus; Simon effect;
Presentation type: Oral presentation / Talk
Session: Simon and his friends: New insights into the processing of task-irrelevant information

Lateralized representations of cause and effect in action observation

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Understanding object-directed actions involves analyzing how body parts interact with objects and how these interactions lead to changes in the objects. However, whether, and if so, how interaction (as cause) and object change (as effect) are distinctively processed in the brain remains unexplored. Based on previous findings, we hypothesized that interaction and change are represented in a lateralized manner in left vs. right nodes of the action observation network, respectively.
In four fMRI sessions, 30 right-handed participants observed videos of object-directed actions (e.g., breaking a stick), corresponding abstract animations (e.g., a triangle hitting a rectangle, causing it to break in half) and, importantly, animations of interaction (triangle hits rectangle) and object change (rectangle breaks in half) in isolation. Using cross-decoding, we isolated either the interaction or change in the actions (train classifier on actions, test on interaction-only or change-only animations, respectively).
As hypothesized, we found that interaction and change are represented in a lateralized manner in anterior inferior parietal lobule (aIPL) and lateral occipitotemporal cortex (LOTC). In addition, in bilateral aIPL, cross-decoding between actions and animations depicting both interaction and change was stronger than the sum of cross-decoding between actions and interaction-only or change-only animations. This super-additive effect points toward a higher-level representation of cause-effect structures beyond representations of interaction and change as isolated components.
These findings demonstrate that left and right hemispheres have distinct roles in representing the interaction between entities and the induced change, respectively, and that interaction and change are integrated to cause-effect structures in aIPL.

Keywords: Action recognition, mechanical reasoning, intuitive physics, fMRI, MVPA
Presentation type: Oral presentation / Talk
Session: Cognitive and Neural Processes Underlying the Perception of Actions, Scenes and Objects II

Visual category representations in the infant brain revealed using multivariate EEG methods

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Visual categorization is a human core cognitive capacity that depends on the development of visual category representations in the infant brain. However, the exact nature of infant visual category representations and their relationship to the corresponding adult form remains unknown. Our results clarify the nature of visual category representations from electroencephalography (EEG) data in 6- to 8-month-old infants and their developmental trajectory toward adult maturity in the key characteristics of temporal dynamics, representational format, and spectral properties. Temporal dynamics change from slowly emerging, developing representations in infants to quickly emerging, complex representations in adults. Despite those differences, infants and adults already partly share visual category representations. The format of infants' representations is visual features of low to intermediate complexity, whereas adults' representations also encode high-complexity features. Theta band activity contributes to visual category representations in infants, and these representations are shifted to the alpha/beta band in adults. Together, we reveal the developmental neural basis of visual categorization in humans, show how information transmission channels change in development, and demonstrate the power of advanced multivariate analysis techniques in infant EEG research for theory building in developmental cognitive science.

Keywords: Infant cognition, cognitive development, visual perception, object recognition, spectral characterization, multivariate analysis, deep learning
Presentation type: Oral presentation / Talk
Session: Cognitive and Neural Processes Underlying the Perception of Actions, Scenes and Objects II

Spatial Orientation in Telepresence with the Help of Continuous Updating between Different Viewpoints

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Spatial orientation is more difficult to gain and retain, usually, when acting in synthetic and remote environments with reduced sensory input than in real environments. Previous studies showed that more cameras or different views can provide better performance in navigation, however, switching between egocentric and allocentric views often proved challenging. In the reported study, we used a treasure hunting game in a virtual environment experienced via a head-mounted display to explore whether egocentric viewpoints (egocentric bird's eye view vs. map) and particularly a continuous viewpoint change from the bird's eye view to the egocentric view on the ground improve performance in a new environment. In the first experiment the respective overview viewpoint (map, bird's eye, continuous) could be accessed repeatedly. Participants used the continuous viewpoint change less often, presumably because it took more time than accessing the map or suddenly switching to the bird's eye view. Despite less frequent support, performance was only slightly impaired in the continuous condition. In the second experiment where the respective overview was provided just once at the beginning of every trial, participants' performance reflected the expected advantage of the continuous change between viewpoints. Furthermore, with sudden switches, the egocentric bird's eye view provided better support than the map view.

Keywords: Spatial Orientation; Continuous Updating; Viewpoint Switching; Navigation
Presentation type: Poster Presentation
Session: Human Factors II

Neural interpolation of dynamic visual information in natural scenes

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Adaptive natural vision requires our brain to interpolate missing information about occluded objects in the environment. Previous studies suggest that this process is supported by visual cortex „filling in" occluded parts of scene images. However, we live in a dynamic world, and objects keep moving in and out of occlusion (e.g., when trains move through tunnels). Here, we used multivariate pattern analysis on time-frequency-resolved EEG data to track neural representations during dynamic occlusion. Participants watched 4-second videos of a person walking across a scene (either left-to-right or right-to-left) while performing an unrelated fixation task. The videos featured three conditions: The person walking across a blank background (isolated condition), across the scene without occlusion (visible condition), or across the scene while being dynamically occluded between 1.5 and 3 seconds (occluded condition). We trained classifiers to discriminate rightward- and leftward-walking in the isolated condition and tested them on the visible and occluded conditions. Classifiers trained on responses in the alpha band (8-12Hz) successfully discriminated walking direction in both conditions, including the time window of occlusion. Critically, we introduced an additional condition during which the person stopped in front of a natural obstacle (e.g., a river). We found that alpha dynamics tracked the termination of motion in this condition even when it was hidden by the occluder. Together, our results provide evidence for an interpolation of information during dynamic occlusion. These alpha dynamics may constitute a neural correlate of top-down processes that „fill in" information based on context.

Keywords: interpolation, neural representations, motion, natural scenes, alpha, MVPA, EEG
Presentation type: Oral presentation / Talk
Session: Natural Scene Perception

The effects of task-irrelevant audiovisual threatening information on visual search performance

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While prior studies found task-irrelevant threatening pictures are harder to ignore than neutral or other valenced ones, they only used static stimuli (pictures) not resembling real-life threat encounters. This study expands the scope by using auditory stimuli alongside videos with sounds and muted videos related to threatening weather conditions (e.g., thunder, lightning, rain) and neutral weather conditions. We seek to explore the impact of threatening task-irrelevant distractors on attentional executive control during a number-matrix task. Task-irrelevant distractors are chosen based on online ratings from an independent sample. Both experimental stimuli and ratings are accessible on the OSF page: https://osf.io/xzfhc/. In the number matrix task, participants search for numbers in a chess-like array in ascending order, starting from number 1, for 30 seconds in each trial. Based on a priori sample size calculation, we plan to recruit 75 participants. We plan to analyze the data with 2x3 mixed ANOVAs with threat level (neutral, threatening) as a within-subject factor and modality (visual, auditory, audiovisual) as a between-subject factor. Behavioral measures will include assessing the time to find Number 1 (RTs) and the total search time for Numbers 1 to 10. Based on the arousal stimulation effect hypothesis, we expect that in the threat compared to the neutral condition, participants will be slower to find Number 1 but will produce faster search times. Further, we expect that this effect will be more pronounced in the audiovisual condition compared to the audio- and video-only conditions.

Keywords: astraphobia, task-irrelevant distractors, multimodal stimuli, number matrix task, visual search, visual working memory
Presentation type: No-Data Poster
Session: Perception III

Team-A collaboration: The effect of generative AI systems on team decision-making processes and outcomes in the hidden profile paradigm

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Generative AI systems like ChatGPT can collaborate with humans on complex decision-making tasks. Yet, little is known about how AI-based decision support affects team decision-making processes and outcomes (Zercher et al., 2023). Research in the field of hidden profiles has shaped our understanding of challenges in team decision-making like the shared information bias (Lu et al., 2012). To explore the effect of AI-based team decision support on information sharing and team decision quality we conducted an experimental-control group design with two experimental conditions in a laboratory setting in a hidden profile scenario. While teams in the control condition did not receive any decision support, teams in the first experimental condition had access to a fully informed AI system, and in the second experimental condition, one team member was replaced by a partially informed AI system.

Keywords: Artificial intelligence, team-AI collaboration, intragroup processes, team performance
Presentation type: Oral presentation / Talk
Session: AI and decision-making: Insights from varied applied settings

Can Sending Emails on one's Own and Peers' Performance and Progress Improve Course Retention in e-Learning?

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Intervention with motivational emails can have a positive effect on course retention in e-learning (Kurtz et al., 2022). It is, however, not yet clear whether sending one's own and peers' performance and progress affect course retention. We used an online course with around 200 students. Students were randomly divided into six groups: 1. individual status (i.e., You have finished x% units) vs. 2. individual progress (i.e., You have finished x% units last week) vs. 3. social status (i.e., Your status is higher than x% of all course participants) vs. 4. social progress (i.e., Your progress last week is higher than x% of all course participants) vs. 5. peer leaderboard (i.e., Here are the top 5 students) vs. 6. no email. Emails were sent weekly for 3 months. In Exp. 1 a high number of participants (11%) who did not complete anything in social status group signed off the course. It indicated that it is not optimal to remind students that they did not complete anything and they are better than 0% of all students. Exp. 2 did not mention that students completed no unit and a high number of students (13%) made progress in social status group. In Exp. 3, no email was sent and no one had completed or made any progress. Across three experiments, the completion rate was extremely low (below 3%). Only students in individual progress and social status groups have completed the course, suggesting these two groups can motivate course retention.

Keywords: motivational email, individual, peer, progress, completion rate, online learning, course retention
Presentation type: Poster Presentation
Session: Memory and Learning I

Spatial vector coding in the human brain

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Various types of cells have been identified in rodent studies to code spatial information relevant for navigation, such as the head direction cells in the Thalamus, place cells in the hippocampus, and grid cells in the entorhinal cortex. Recently, a vector coding scheme has also been observed in rodents (Deshmukh and Knierim, 2013) as well as in humans (Kunz et al., 2021), where activities of sub-populations of cells are modulated by either non-extending landmark or boundaries at a certain distance and direction from the navigator. In this study, we examine such vector coding in healthy young adults with fMRI. Participants memorized four target locations in relation to a fixed landmark in a virtual environment, with the landmark providing both directional and distance information. Representational similarity analysis (RSA) reveals that various regions within the navigational network (e.g, the precuneus) as well as the visual-processing areas track participants' locations relative to the landmark. In addition, multivoxel pattern responses in the retrosplenial cortex and the lateral occipital area reflect the Euclidean distance information between targets.

Reference:
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Kunz L, et al. A neural code for egocentric spatial maps in the human medial temporal lobe. Neuron. 2021 Sep 1;109(17):2781-2796.e10

Keywords: Spatial Navigation; Vector Coding; fMRI; Virtual Environment; Navigational Network
Presentation type: Oral presentation / Talk
Session: Egocentric and allocentric reference frames: Integrating across measures, task complexity, and spatial scales

Why Do More Numerate People Make Better Decisions? A Computational Explanation Based on Attentional Dynamics

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In decisions under risk more numerate people are typically more likely to choose the option with the highest expected value (EV) than less numerate people. Prior research indicates that this link between numeracy and decision quality cannot be explained by differences in the reliance on explicit calculation of EVs between the more and less numerate—raising the question, which other pre-decisional processing mechanisms might give rise to it. The current work uses the attentional Drift Diffusion Model (aDDM, Krajbich et al., 2010) as a unified computational framework to formalize, quantify and disentangle several candidate mechanisms. The model is used to derive hypotheses about three key aspects of pre-decisional information search and processing—namely attention allocation, amount of deliberation, and attentional modulation of information integration—which may differ between more and less numerate people and which may explain why more numerate people tend to make better decisions. The analyses show that while numeracy barely affects how people allocate their attention across the options (captured using eye-tracking), it systematically modulates how much information people require before committing to a choice (captured in the aDDM's boundary separation parameter) and also how strongly their processing of information is distorted by what they attend to prior to making a choice (captured in the aDDM's attentional amplification parameter). Together, the latter two aspects mediate the effect of numeracy on decision quality to a large extent. Thereby, the current account offers a new, integrative and formally rigorous angle on the cognitive underpinnings of the link between numeracy and decision quality.

Keywords: attention, decision making, drift-diffusion model, numeracy, decision quality, computational modeling
Presentation type: Oral presentation / Talk
Session: Numerical Cognition / Crossmodal Perception

Neuronal processing of heterogenous-symmetric letter-combinations reveals cognitive conflict before symmetric evaluation: an ERP-study comparing flanker task vs. symmetric judgements

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In flanker tasks, heterogenous-symmetric letter-combinations (e.g., HXH) typically indicate decreased behavioral performance when compared to homogeneous combinations (e.g., HHH) or heterogenous-asymmetric combinations (e.g., HHX; Donohue et al., 2016). Despite of the stimulus conflict being task-irrelevant, this performance decline was even stronger when presenting the identical letter combinations in a symmetry judgment task instead of a flanker task (Kähler et al., 2020). Thus, symmetric judgements might be deteriorated by an underlying conflict interference. Using the ERP-components Ninc as an indicator for cognitive conflict and SPN as an indicator for symmetry evaluation, we tested for neuronal evidence of conflict processing during symmetry judgments. Participants performed both tasks in separate blocks, order counterbalanced. In both tasks, behavioral reaction-times were fastest to homogeneous stimuli compared to all other stimulus conditions, and even more pronounced during the symmetry than flanker task. In contrast, error-rates only differed in the symmetry task by indicating more errors for the heterogenous-symmetric condition compared to all other conditions. In the ERP-data, Ninc-activity was increased, independently of tasks, when comparing heterogenous-symmetric and heterogenous-asymmetric conditions to the homogenous condition. Further, in the symmetry task, an early SPN-activity (250-300ms) was pronounced for the homogenous condition, switching however to a late SPN-activity (350-500ms) with a remarkable negativity increase for heterogenous-symmetric condition. Thus, while conflict-related Ninc-activation seemed to mirror reaction-time differences, late symmetry SPN-activity seemed correlated to error-rates. In conclusion, processing of heterogenous-symmetric letter-combinations seems to lead to cognitive conflict before symmetry evaluation, even when conflict between letters is irrelevant to the current symmetry judgement.

Keywords: Symmetry, Flanker, cognitive conflict, Ninc, SPN, ERP
Presentation type: Poster Presentation
Session: Cognitive Control and Conflict I

Temporal aspects of neural representations underlying action observation

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Previous studies using representational similarity analysis (RSA) of fMRI data demonstrated that activation patterns in the lateral occipito-temporal cortex (LOTC) during action observation capture the semantic similarity structure of actions, in line with the view that the LOTC contributes to action understanding. Here we aimed to investigate the time course of neural representations of low-, mid- and high-level action features.
We recorded EEG from 24 participants in a delayed matching task. Stimuli consisted of static images spanning 27 action categories of everyday actions (e.g. riding a bike, drinking coffee), shown in different combinations of actors, locations and viewpoints. Participants were asked to match stimuli on action category, actor, or location.
Separately for each time point we computed representational dissimilarity matrices (RDMs) pertaining to neural representations of action categories from time-resolved multivariate pattern analysis of EEG data. These neural RDMs were correlated to independently generated behavioural RDMs corresponding to semantic action (dis)similarities, revealing a time course of neural semantic action representations. In addition, we determined RDMs to capture the similarity of movement type, body part, scenes, and objects, revealing the respective neural representations over time.
We observed that semantic organizing principles observed in the LOTC can be observed from approximately 150 ms post stimulus presentation onwards, whereas organizing principles related to action context and kinematics can already be observed earlier. These outcomes suggest that neural representations pertaining to low- and mid-level action features precede those of semantic action features, capturing the computational steps that allow humans to recognize observed actions.

Keywords: action recognition, goal-directed actions, lateral occipito-temporal cortex, EEG
Presentation type: Oral presentation / Talk
Session: Cognitive and Neural Processes Underlying the Perception of Actions, Scenes and Objects II

Arousal of task-irrelevant emotional faces and social anxiety predict visual search performance

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Past research has shown that the arousal level of emotional faces as targets in a visual search paradigm is a more influential factor on performance than the emotional category of the face (e.g., angry, happy). These studies did not address the effect of facial stimuli on executive attentional processing (i.e., inhibition), which is a crucial factor in attentional biases. Understanding attentional biases to emotional faces has clinical implications for social anxiety, as they play a vital role in the acquisition and maintenance of the disorder. The goal of the present study was to test the effects of task-irrelevant emotional arousal elicited by emotional faces on visual search performance. In Experiment 1, facial expressions acted as distractors presented throughout the task. In Experiment 2, faces were presented only before the task. We found that the level of arousal elicited by faces can better describe their effects on visual search performance compared to their discrete emotional categories. In Experiment 1, faces with higher arousal ratings were more distracting, possibly because active inhibition is necessary to solve the task. However, in Experiment 2, higher levels of arousal resulted in better performance, possibly because they activate the arousal system, initiating readiness for action. We also showed that social anxiety diminishes attentional performance due to its influence on executive processing. This does not support the involvement of bottom-up attentional biases in the maintenance of social anxiety that many interventions seem to target.

Keywords: orienting network; executive attention; number matrix; attentional biases; valence; intensity
Presentation type: Poster Presentation
Session: Clinical and Biological Psychology

Author Index

A

Abel, Magdalena 8, 19, 27
Abubshait, Abdulaziz 285
Albergo, Dalila 371
Albrecht, Rebecca 350
Alldinger, Luca 27
Alles, Alexandra 28
Alonso, Jorge González 265
Alves, Hans 164
Amado, Sonia 178
Ammalainen, Artur 29
Anders, Gerrit 141
Andres, Johannes 239
Angelike, Tim 29
Antes, Nicole 30
Arend, Matthias G. 31
Arslan, Burcu 31
Aslan, Alp 32
Asokan, Tharanirakshita 33
Aust, Rouven 33
Avram, Mihai 193
Aydin, Tolgahan 34
Azañón, Elena 35
Aziz-Safaie, Taraneh 261

B

Baader, Malte 423
Bading, Karoline Corinna 35
Baess, Pamela 21, 36, 106, 196
Bahmani, Hamed 183
Bahn, Daniela 388, 391
Bahrami, Bahador 333
Baier, Denise 253
Bali, Cintia 36
Balogh, Vivien 187
Baltaretu, Bianca 10, 37
Baltaretu, Bianca R. 383
Banerjee, Sayani 38
Banh, Ngoc Chi 39
Bánki, Anna 39, 157
Banse, Rainer 300
Bao, Yongping 40
Bardelang, Max 429
Barnow, Sven 295
Barth, Marius 35
Bartl, Johannes 41, 189
Bartossek, Marie Therese 41
Barzykowski, Krystian 42, 43
Basgol, Hamit 43
Basler, Julia 44, 187, 435
Baumann, Alexander 45
Baumann, Martin 11, 71, 252
Bäuml, Karl-Heinz 41
Bäuml, Karl-Heinz T. 189, 271
Bausenhart, Karin 99, 222
Bausenhart, Karin M. 45
Bayen, Ute J. 75, 154, 324
Becchio, Cristina 333, 371, 372
Beck, Sara D. 410
Beck, Sigrid 279
Becker, Fritz 47, 325
Becker, Markus 46
Bekrater-Bodmann, Robin 47
Belke, Eva 48
Bell, Raoul 49, 288
Bendel, Oliver 213
Benini, Elena 12, 49
Benke, Ivo 430
Bereczkei, Tamas 306
Bergen, Melina 50
Berger, Alexander 51
Berghoefer, Frauke 256
Bermeitinger, Christina 36, 58, 106, 143
Bernhardt, Lukas 130
Berntsen, Dorthe 3, 208
Beste, Christian 168, 255
Betsch, Cornelia 365
Bhatia, Kriti 51
Bielig, Mona 400
Biendl, Marcel 296
Biesaga, Mikołaj 52
Billino, Jutta 246
Birk, Marisa 53
Birkás, Béla 187
Bischoff, Alwine 205
Blau, Matthias 310
Blech, Christine 53
Blöck, Alexander 54
Blunck, Dina 45
Blurton, Steven 55
Bockes, André 55
Böckler, Anne 216
Böckler-Raettig, Anne 352
Bodemer, Daniel 392

Bodenmann, Guy 241
Boeltzig, Marius 56, 57
Böer, Nils 137
Böer, Nils Tobias 57
Bogenschütz, Luisa 58
Bognar, Miklos 59
Bogon, Johanna 25, 59, 199, 308
Bolenz, Florian 60
Boller, Alina 139
Bölling, Luke 107, 431
Bolz, Zoe 60
Bonfert, Michaela 61
Bonnay, Denis 175
Borghini, Giulia 371
Börner-Schröder, Corinna 61
Borst, Jelmer 395
Bosek, Robert 276
Bouzidi, Yann 62
Bracci, Stefania 81
Brade, Jennifer 428
Braem, Senne 3, 76, 140, 214
Bramão, Inês 57
Brand, Melvin 411
Brand, Theresa K. 63
Brandenburg, Stefan 11
Brandl, Felix 193
Brandt, Martin 322
Brandt, Miriam 170
Brandt, Thorben 27
Brass, Marcel 395
Brattico, Elvira 63
Bratzke, Daniel 64
Braun, Doris 340
Bräutigam, Linda 65
Brede, Max 65, 226, 239
Brich, Irina 397
Brielmann, Aenne 66
Brinkmann, Kerstin 67
Bröder, Arndt 67, 164, 219, 226, 268, 335
Brodoehl, Stefan 339, 365
Brüge, Peter 296
Brüning, Jovita 16, 68
Brunner, Romuald 95, 165, 168, 276, 327, 341
Bryce, Donna 69, 94
Bublak, Peter 247
Buchner, Axel 49, 69, 288
Buchner, Claudia 71
Buchner, Emily 70
Buder, Jürgen 47
Bugg, Julie 163
Burghardt, Juliane 71
Burghardt, Katalin 194
Busch, Nuno 79
Buss, Claudia 286

C

Cakir, Mehtap 72
Cambronero-Delgadillo, Alejandro J. 73
Cambronero-Delgadillo, Alejandro Javier 265
Capuano, Francesca 73
Carbon, Claus-Christian 131, 191, 400
Casado-Palacios, Maria 74
Cavallo, Andrea 333
Cecchetti, Luca 250
Cecil, Julia 6, 75
Cellini, Nicola 250
Cezar, Désirée 75
Chai, Mengqiao 76, 214
Chaidaridou, Christiana 410
Chang, Acer 77
Charlton, Colleen E. 145
Chen, Jiayu 432
Chen, Lixiang 176
Cheng, Sen 77
Chessa, Manuela 234
Cichy, Radoslaw 427
Cichy, Radoslaw M 176
Cieslik, Edna C 261
Clausen, Alexandra 78
Cleeremans, Axel 243
Cole, Scott 409
Conci, Markus 79
Conrad, Samuel 80
Cortinovis, Davide 81
Croy, Ilona 81
Csányi, Edit 82, 179
Culbreth, Adam 193

D

Daiss, Fabian 83
Dames, Hannah 287
Danaj, Federica 83
Danek, Amory H. 84
Dannlowski, Udo 153, 377
Danwitz, Ludwig 40, 186
Darnstaedt, Daniel 85, 210
Daschowski, Yvonne 85
David, Erwan 263
Dayan, Peter 43
de Haas, Benjamin 130
de Lange, Floris P. 222
de Vries, Ingmar 53
Deak, Anita 306
Dedetas Satir, Hatice 86
Deeb, Abdul 92
Dehn, Kira I. 234
Del Popolo Cristaldi, Fiorella 250
Della Libera, Lina 277
Demir, Mirkan 186
Demler, Verena 87, 369
Dercksen, Tjerk 88
Derks, Deborah 376
Desch, Simon 88
Deutsch, Thomas 104
Diaconescu, Andreea O. 145
Diegel, Gabriel 210

Diers, Martin 259
Dietrich, Susanne 89
Dignath, David 90, 238, 372
Dilawar, Rabia 90
Dodwell, Gordon 91
Doerschner, Katja 92
Doherty, Liam 183
Dombai, Nóra 36
Domini, Fulvio 92
Donkin, Chris 9, 93, 99, 198, 275, 378
Donkin, Christopher 393, 408
Dorrough, Angela 113
Downing, Lia 181
Downing, Paul 83
Dreisbach, Gesine 135, 199, 207, 230, 246
Drewing, Knut 23, 92, 171, 180
Duderstand, Hannah 128
Dudschig, Carolin 344, 348, 421
Duñabeitia, Jon Andoni 265
Dvorak, Fabian 40
Dyduch-Hazar, Karolina 94

E

Eayrs, Joshua O. 214
Eberhardt, Lisa 208
Eberhart, Janina 69, 94
Ebert, Miro 95
Echterhoff, Gerald 405
Eckardt, Valeria 241
Ecker, Angelika 95, 168, 327
Eder, Andreas 96, 161
Eder, Andreas B. 94
Eickhoff, Simon B. 261
Eickhoff, Simon B. 277
Eimer, Martin 91
Einhäuser, Wolfgang 246
Eisele, Daniel 97
Eisen, Maike 97
Eisner, Julia 132
Eisterhues, Tom 309
Ekerdt, Clara 98
Ellermeier, Wolfgang 78, 143
Ellinghaus, Ruben 99
Embrey, Jake 99
Ende, Luise 100
Engeser, Micha 101
Englert, Julia 102, 147
Entringer, Sonja 286
Eppinger, Ben 102
Erdfelder, Edgar 235, 298, 380
Esch, Christopher 103, 104
Ettinger, Ulrich 16
Evans, Nathan 408
Exner, Cornelia 186

F

Falanga, Luigi 104
Falck, Johannes 105
Falk, Johanna R. 123
Fandakova, Yana 7, 347, 415
Fang, Huilin 324
Fares, Farid 104
Faßbender, Laura 105
Feder, Sascha 246
Fehér, Adrián 106
Fehér, Zsuzsanna 36
Fehrler, Sebastian 40
Fels, Janina 104
Feng, Chunliang 261
Fenske, Pia 106
Fenzl, Alexander 347
Ferencz, Tas 194
Fernández, Guillén 98
Ficco, Linda 261
Fiehler, Katja 10, 37, 124, 244, 269, 383, 404
Finke, Kathrin 240, 247, 339, 365
Finkler, Anna-Lena 107
Fischer, Kerstin 107
Fischer, Martin 223
Fischer, Martin H. 213, 251, 353
Fischer, Olivia 108
Fischer, Rico 68, 174, 230, 234, 270, 361
Fladerer, Martin P. 203
Fleming, Roland W. 234
Fleming, Stephen 141
Flieger, Philipp 109, 427
Föcker, Julia 181
Foerster, Anna 109, 117
Folyi, Tímea 28
Ford, Daria 110
Ford, Judith M. 145
Forster, Yannick 200
Fotler, Diana 402
Foucher, Valentin 111
Foxwell, Matthew J 176
Frahm, Christiane 339
Framorando, David 111, 123
Frank, Celine 113
Frank, Cornelia 344
Frank, Sebastian 112
Frank, Sebastian M. 46
Franke, Kira 113
Franke, Thomas 130, 339
Franz, Volker 51, 133
Franz, Volker H. 43, 54, 248
Frauhammer, Luna 114
Freiherr von Castell, Christoph 424
Frenzel, Anne C. 218
Frenzel, Anne Christiane 316
Frey, Dieter 203
Frey, Renato 108, 227
Frick, Pauline 115
Friebe, Kassandra 115
Friedrich, Amos-Silvio 241
Friedrich, Claudia 332
Friedrich, Elisabeth 116, 155

Friedrich, Jannis 117
Frings, Christian 96, 109, 117, 122, 148, 168, 249, 255, 264, 269, 329, 336, 358, 360
Fröber, Kerstin 118
FU, WANLU 119
Fulawka, Kamil 278

G

Gade, Miriam 119, 196
Gagl, Benjamin 142, 326
GAGL, BENJAMIN 119
Gail, Alexander 120
Gamer, Matthias 386
Gao, Shanqing 121
Gaschler, Robert 210, 431
Gáspár, Gréti 187
Gast, Anne 121, 297
Gaube, Susanne 75, 198
Gawrilow, Caterina 90, 332
Gegenfurtner, Karl 340
Geis, Christian 365
Geissler, Christoph 148
Geißler, Christoph 122
Gendolla, Guido 23, 62
Gendolla, Guido H.E. 123
Georgiadis, Petros 124
Gerharz, Leonard 124
Gernandt, Emily 125
Gessele, Lena 83
Getu, Amrote 190, 209
Getu, Amroté 126
Ghavam Rankohi, Zahra 364
Ghorbani, Foroogh 168
Giebeler, Yasmina 126, 127
Giersiepen, Maren 128
Giesen, Carina 96, 113, 137
Giesen, Carina G. 11, 128, 268
Gilchrist, Iain 73
Gillebert, Celine 384
Glawe, Marik 102
Glöckner, Andreas 113
Gluth, Sebastian 129, 133, 237, 272
Gödker, Markus 130
Goettker, Alexander 130, 340
Goetz, Itay 131
Goetz, Lili 253
Goller, Florian 132
Gollwitzer, Peter M. 123
Goodarzi, Golfam 160
Gopnarayan, Mrugsen 133
Göppert, Frieder 133
Görgen, Kai 260
Görgen, Marie 210
Gori, Monica 74
Gorlo, Jon 186
Goschke, Thomas 41
Gößwein, Eva 134
Götz, Felix 206
Götz, Felix Johannes 135
Grabmeier, Judith 369
Granacher, Urs 260
Grange, James A. 49
Grange, Jim 135
Grätsch, Esther Ivanka 402
Graupner, Sven-Thomas 97
Graziano, Michael 371
Greenlee, Mark 408
Greenlee, Mark W. 289, 402
Griffiths, John 145
Grimm, Sabine 246
Groß, Julia 204
Grosse Wiesmann, Charlotte 136
Grote, Paula 231, 232
Grüning, David 136
Gubernath, John 85
Güldenpenning, Iris 57, 137, 417
Gülgöz, Sami 320
Gümüsdagli, Fabian E. 75
Gupta, Siddhima 138
Gurbuz, Emre 138
Gutzeit, Julian 139

H

Habel, Ute 412
Habibi, Mina 140
Hackländer, Ryan P. 8, 19, 143
Hackländer, Ryan P. M. 58
Hagena, Verena 259
Haider, Hilde 174, 313, 381, 421
Hake, Holly 141
Halamish, Vered 393
Hamaloğlu, Simge 34, 141
Hamburger, Kai 345
Hampe, Hanna 142
Hamzeloo, Mohammad 143
Hanisch, Meike 231, 232
Hartmann, Annika 211
Hartmann, Frieder 234
Hartmann, Raphael 195
Hartwig, Louisa 211
Hassanzadeh Dehka, Mitra 143
Hato, Tuba 144
Haubner, Judith 144
Hauke, Daniel J. 145
Haupt, Marleen 365
Häußermann, Karin 378
Haynes, John-Dylan 41
Hayn-Leichsenring, Gregor 146
Hebart, Martin 55
Hebart, Martin N. 370
Hecht, Heiko 417, 424
Heck, Daniel W. 242
Heckner, Marisa K. 277
Hegele, Mathias 63
Hehnen, Melissa 203
Heidinger, Jan 130

Heilmann, Antonia 102, 147
Heim, Christine M. 286
Hein, Elisabeth..... 148, 206
Heinen, Florian 61
Heinzel, Stephan 260
Heinzl, Armin 430
Hell, Lorena 148
Heller, Jürgen 149, 197, 267
Hellmann, Sebastian..... 149, 301
Helmert, Jens R..... 97
Hemming, Wiebke..... 150
Henninger, Felix 151
Hensen, Sandra 151
Henze, Niels..... 59, 308
Herbold, Erika..... 213
Herbort, Oliver 152, 202
Herbsleb, Marco..... 339
Herchenhahn, Lena 152, 239
Herkströter, Florentine 153
Hernandez-Urbina, Victor 183
Herpertz, Stephan 259
Herrmann, Joscha..... 322
Hesse, Friedrich..... 431
Hesselmann, Guido 185
Hesselmann, Prof. Dr. Guido 413
Hesslinger, Vera 131
Het, Aylin..... 411
Hey, Carolin V. 154
Hilla, Yannik..... 18, 116, 155
Hille, Maike 415
Hirsch, Patricia..... 151, 155, 299
Hirschfeld, Gerrit..... 166
Hoang, Tracy..... 298
Hoehl, Stefanie..... 427
Hof, Linus..... 156
Hoffmann, Jerome..... 121
Höfler, Margit..... 73, 265
Hofmann, Philipp..... 156
Högerl, Julian..... 308
Höhl, Stefanie..... 157
Höhs, Johanna 121
Höhs, Johanna M. 158
Holt, Daniel V. 295
Hölting, Luise..... 139
Holub, Sandra..... 132
Hommel, Bernhard..... 290
Horchler, Nadine 337
Hornuf, Lars..... 40
Horstmann, Gernot 225
Horvath, Dorottya 158
Hosch, Ann-Katrin 159
Hsieh, Shulan..... 326
Hu, Dan..... 277
Huang, Pi-Chun..... 326
Hübner, Ronald 160, 391
Huckauf, Anke 13, 72, 111, 208, 218
Hudecek, Matthias 75
Huenges Wajer, Irene..... 384
Huestegge, Lynn..... 139, 160, 215, 300
Huff, Markus.....30, 34, 47, 141, 280, 318, 397
Hugenberg, Kurt..... 418
Hummel, Thomas 8, 161
Huseynzade, Ulkar..... 161
Hütter, Mandy..... 158, 162, 271, 416

I

Ilczuk, Ewa..... 43
Ileri-Tayar, Merve..... 163
Ingendahl, Moritz..... 10, 164
Ischebeck, Anja..... 265
Itakura, Shoji 157
Izydorczyk, David..... 164

J

Jacob, Ricarda..... 165
Jacobsen, Thomas 11, 236
Jagemann, Inga..... 166
Jagorska, Cindy..... 166
Jahn, Georg 144, 428
Jakob, Marie..... 167
Jamous, Roula 168
Janczyk, Markus 51, 174, 250, 313
Janković, Dragan..... 131
Jansen, Petra 83, 95, 156, 232, 341, 356
Jansson, Jullie..... 194
Janzen, Gabriele 98
Jarvers, Irina 15, 95, 165, 168, 276, 327
Jeitziner, Loris Tizian 169
Jekel, Marc 358
Jeong, Ga-Ram..... 170
Jescheniak, Jörg D. 170
Jeschke, Michaela..... 171
Job, Veronika..... 254
Johannes, Christine 296
Johannsen, Leif..... 195
Johansson, Mikael 57
Jokhio, Sarang 252
Jost, Leonardo 95, 172
Josupeit, Judith..... 172
Jovanovic, Bianca 33, 105
Jubran, Omar..... 173
Jung, Amelie C. 174
Jung, Kyesam..... 277
Jussupow, Ekaterina..... 174, 430

K

Kacperski, Celina 175, 400
Kaiser, Daniel..... 101, 109, 176, 266, 429
Kaiser, Jakob..... 21, 128, 175
Kallmayer, Aylin..... 177, 263, 311
Kals, Elisabeth..... 103, 104
Kämpfer, Jonas..... 177
Kandsperger, Stephanie .95, 165, 168, 276, 327, 341
Kappas, Arvid..... 290
Karaaslan, Aslan 178, 363
Károlyi, Lili 179

Karsh, Noam 179
Katircilar, Didem 23, 180
Kattlun, Fabian 339, 365
Kattner, Florian 78, 80, 143, 181
Kauk, Julian 205
Kaup, Barbara 45, 73, 222, 279, 348, 416, 421
Kaupert, Lisa Sophie 181
Kauschke, Christina 388, 391
Kayhan, Ezgi 427
Keidel, Kristof 182
Keil, Julian 183
Keinath, Andreas 200
Kempkens, Niels 183
Kidd, Evan 98
Kiefer, Markus 51, 184, 188, 320
Kiepe, Fabian 185
Kiesel, Andrea 195, 257, 287, 372, 402, 407
Kieslinger, Anne-Sophie 170
Kiiski, Hanni 183
Kinder, Annette 185, 283
Kingo, Osman 208, 362
Kinner, Jule 186
Kirsch, Franziska 186
Kiss, Botond 435
Kiss, Botond László 187, 430
Kiss, Dóra Eszter 36
Kissler, Johanna 411
Klaiber, Ingo 188
Klanke, Jan-Nikolas 189
Klauer, Karl Christoph 167
Klein, Johanna 378
Kliegl, Oliver 22, 41, 189, 280
Klier, Chantal 190, 209
Kliesch, Christian 427
Klimant, Philipp 428
Kloeckner, Nils 191
Kloss, Yanick 191
Klötzel, Alicia 45
Klute, Alina 181
Knaup, Lara 41
Knauth, Kilian 359
Knoblich, Günther 115, 238
Knolle, Franziska 87, 192, 193, 369, 383
Koch, Iring 49, 104, 151, 155, 195, 258, 299, 305, 308, 326, 357, 375
Koch, Kathrin 193
Koch, Sarah 194
Kocsor, Ferenc 194
Kocur, Martin 95, 308, 327
Koester, Dirk 379
Koger, Anton 195
Kohle, Maike 196
Kohler, Dorina 197
Kohler, Julia 196
Kokje, Eesha 198
Kollakowski, Nina-Alisa 199
Köllnberger, Katrin 199
Komar, Gesa Fee 49
Kondzic, Dennis 121
Koniakowsky, Ina 200
Konkle, Talia 370
Kopp, Bruno 201
Korber, Svenja 296
Körner, Christof 73
Köster, Moritz 5, 38, 157, 201, 286, 427
Krause, Anika 203
Krause, Lisa-Marie 152, 202
Krauth, Stefanie 203
Krebs, Ruth 214
Kreis, Barbara 204
Krems, Josef 200
Kretz-Bünese, Tanja 97
Kreysa, Helene 205
Kriegeskorte, Meike 206
Krishna, Anand 96, 206
Kristjánsson, Árni 390
Kroczek, Leon 207, 310, 330
Krøjgaard, Peter 208
Krug, Alina 208
Krüger, Karla 190, 209
Kubik, Veit 210
Kübler, Sebastian 85, 210
Kuhlen, Anna 211, 351
Kuhlmann, Beatrice G. 335, 373, 380
Kuhlmann, Kerstin 212
Kühlwein, Tobias 212
Kühne, Katharina 213
Kühnel, Anja 214
Kukkonen, Nanne 214
Kulshrestha, Juhi 175
KUMAR ASTHANA, MANISH 281
Kunde, Wilfried 51, 137, 191, 254, 304, 322, 338, 413, 422
Kunkel, Kevin 289
Künstler, Erika 247
Kurmanbekova, Kurmanzhan 397
Kürten, Jens 215
Kushvah, Jai Prakash 354
Küster, Dennis 290
Kutzner, Florian 400
Kvavilashvili, Lia 43

L

Lábadi, Beatrix 435
Lachmann, Thomas 173
Lafosse, Christophe 384
Landmann, Eva 216
Lang, Vincent 287
Lange, Elke B. 125
Lange-Kuettner, Christiane 216
Langer, Markus 328
Langner, Robert 261, 277
Langsdorf, Leif 85
Langsdorf, Leif E. 217, 317
Lau, Wee Kiat 218
Lavric, Aureliu 375

Laybourn, Sara 218
Le Mens, Gaël 273
Leipold, Franziska M. 219
Lekebusch, Lynn 221
Lemhöfer, Kristin 98, 220
Lemmens, Robin 384
Lencer, Rebekka 153, 377
Lenhard, Wolfgang 70
Lenk-Blochowitz, Annika 100, 296
León, Gustavo 220
Lepori, Fabrizio 234
Lerche, Veronika ...65, 118, 152, 221, 226, 239, 329, 399
Lerebourg, Maëlle 222
Lermer, Eva 75, 198
Leuker, Christina 85
Leuthold, Harmut 253
Leuthold, Hartmut 65
LeVinh, Lilian 222
Li, Xin 223
Liebherr, Magnus 134
Liedtke, Nina 56
Liepelt, Roman 53, 99, 107, 270, 361, 364, 431
Liesefeld, Heinrich R. 250
Lin, Hsuan Yu 40
Lin, Hsuan-Yu 224
Lin, Lisa Piu Yi 92
Lindemann, Oliver 251
Lindenmann, Andreas 402
Lindner, Dana 224
Lingnau, Angelika 8, 55, 83, 303, 404, 434
Linke, Linda 225
Liss, Julia 226
Liu, Hesheng 277
Liu, Xiaotong 226
Lob, Aaron 108, 227
Löffler, Annette 18, 228
Logemann, Hannah Timna 85
Logvinenko, Tatiana 228, 277
Longo, Matthew R 35
Lorenz, Katharina 124
Lorenzen, Joshua 399
Löschner, Deborah Maria 229
Lubich, Jennifer 289
Lück, Inga 16, 68, 230
Luckow, Jana 170
Ludwig, Larissa 102
Luna, Fernando G. 230
Lupiáñez, Juan 230
Lütkewitte, Marika 231, 232
Luttmann, Carla 232
Luzsa, Robert 233

M

MacGregor, Lucy 369
Mack, Wolfgang 155, 321, 366, 367
Mackenzie, Ian 65
Mackenzie, Ian Grant 253
Maggioni, Martina Anna 294
Mahesan, Devu 234
Mähler, Felix 127
Maiello, Guido 234
Malejka, Simone 235
Malloni, Wilhelm 165
Mallot, Hanspeter A. 222
Manca, Giulia 236
Mandal, Ananya 218
Mankel, Rosalie 102
Manolika, Maria 11, 236
Manzi, Guido 371
March, Jennifer 237, 272
Marinkovic, Teodora 277
Marinov, Maxim 61
Markantonakis, Elena 220
Markkula, Gustav 252
Marschner, Maximilian 238
Marti, Melvin 374
Martin, Carlo 239
Martin, Eva Maria 240
Martiny-Huenger, Torsten 240
Marx, Anton 97, 241
Marx, Anton Karl Georg 316
Marx, Nicole 326
Mason, Alice 99
Mata, André 136
Mathalon, Daniel H. 145
Mathar, David 359
Mathys, Christoph 369
Matthias, Eva 241
Matthiesen, Sven 402
Mattioni, Stefania 214
Matzo, Flynn 242
Maurelli, Francesco 290
Maurer, Heiko 63
Maurer, Lisa K. 63
Maurer, Meret 181
Maydych, Viktoria 217, 292
Mayer, Maren 242
Mayr, Susanne 49, 233, 256, 305
Mazza, Alessandro 243
McCaughey, Linda 244
McCrea, Sean M. 386
McManus, Meaghan 10, 124, 244
McQueen, James M. 98
Medendorp, Pieter 245
Meier, Evamaria 402
Meißner, Sofia 181
Meissner, Sophie 246
Memeo, Mariacarla 333
Mendl, Jonathan 246
Menks, Willeke M. 98
Menrad, Solveig 247
Merkel, Christian 35
Merrill, Julia 125
Merz, Simon 248, 360
Meskó, Norbert 82, 275

Meyen, Sascha 133, 248
Meyerhoff, Hauke S. 107, 249
Michaelsen, Talke 250
Michalkiewicz, Martha 75
Micillo, Luigi 250
Mier, Daniela 332
Mieth, Laura 49, 288
Miklashevsky, Alex 251
Miksch, Jochen 246
Milek, Anne 241
Miller, Linda 252
Mioni, Giovanna 250
Mitschke, Vanessa 94, 253
Mittelstädt, Victor 65, 253
Mlynski, Christopher 254
Mminele, Katharina 226
Mocke, Viola 254, 338
Moeller, Birte 109, 117, 148, 255, 269, 312
Moeskops, Merle 427
Möller, Malte 49, 256, 305
Møller, Mette 256
Momen, Ali 418
Monno, Irina 257, 407
Montag, Christian 320
Moog, Nora 286
Moretti, Luca 49, 258
Morgenroth, Olaf 258
Moriguchi, Yusuke 319
Morina, Nexhmedin 102, 147
Mosch, Benjamin 259
Möschl, Marcus 41
Mückschel, Moritz 168
Mückstein, Marie 260
Mueller, Ilka 295
Mueller, Ronja 191
Mueller, Stefanie 261
Mühlberger, Andreas 207, 330
Muhmenthaler, Michèle 308
Müller Karoza, Lea 264
Müller Karoza, Lea Alexandra 263
Müller, Dario 412
Müller, Fynn Leon 181
Müller, Hermann 63, 195
Müller, Hermann J. 79
Müller, Romy 262
Müller, Veronika I 261
Müller, Veronika I. 277
Münchau, Alexander 168, 255
Münster, Nicolas D. 264
Muntini, Laís 265
Münzer, Stefan 86
Mur, Marieke 4
Musch, Jochen 29
Muthwill, Allegra 309

N

Nachtnebel, Sarah Jasmin 265
Nadarevic, Lena 110
Nako, Rebecca 91
Nara, Sanjeev 266
Naumann, Katharina 267
Navarro-Báez, Sofia 19, 67, 268
Nebe, Stephan 268
Nemeth, Maria 269
NeNaE-Consortium, Study 240
Nestoropoulou, Athina 269
Nett, Tillmann 270
Neubaum, German 114
Neumann, Inga 165
Newell, Ben 99, 275
Nickl, Anna T. 271
Niese, Zachary 271
Nikolovska, Kristina 290
Nitsch, Verena 31
Noesselt, Tömme 88
Nolasco, Sarah 34
Nowak, Andrzej 52
Nusser, Lisa 425

O

Oberbauer, Barbara 272
Oberhofer, Kathrin 337
Ockl, Katharina 249
Oehl, Michael 27, 337
Oettingen, Gabriele 123
Oftring, Chiara A. 419
Ohl, Sven 189
Olschewski, Sebastian 273, 349
Öner, Sezin 320, 409
Orbán, Rebeka 273
Örbom, Saga 401
Orgs, Guido 274
Orsi, Gergely 306
Őry, Fanni 275
Osenberg, Angela 51
Ostrovsky, Tehilla 275, 393
Otto, Alexandra 165, 276, 341
Ovalle-Fresa, Rebecca 315
Öykü, Camligüney 277

P

Paas Oliveros, Lya K. 277
Pachur, Thorsten 9, 60, 156, 204, 278
Palmetshofer, Alina 279, 416
Pamela, Baess 220
Paneth, Lisa 169
Pannasch, Sebastian 97
Pansardi, Oriana 371
Papenmeier, Frank 73, 141, 280
Pastötter, Bernhard 22, 117, 210, 280
Pastukhov, Alexander 131
PAUL, TRIPURESHWARI 281
Paul, Yannik 239
Paulun, Vivian 281
Paulun, Vivian C. 20
Paulus, Andrea 138

Paulus, Markus 199, 368
Pauly, Marcel 282
Pauly, Reena 283
Peelen, Marius V. 222
Pegna, Alan J. 111
Pekar, Judit 185, 283
Perez-Osorio, Jairo 284, 285
Périard, Isabelle 286
Perlaki, Gabor 306
Peters, Jan 359
Petersen, Anders 55, 286
Petzoldt, Tibor 97
Pfeuffer, Christina 103
Pfeuffer, Christina U. 287
Pfister, Roland 109, 117, 191, 322, 386
Philipp, Andrea 119
Philipp, Andrea M. 49
Philipp, Sprengholz 312
Philippsen, Ana 288
Pieper, Julia 289
Pinheiro, Ana 289
Pitcher, David 176
Pittino, Ferdinand 208
Pittner, Katharina 286
Plank, Tina 289, 402
Pläschke, Rachel N. 277
Pletti, Carolina 199
Pohárnok, Melinda 273, 291
Pohl, Jan 20, 290
Pohl, Steffi 121
Polgár, Petra Ibolya 291
Pöschel, Hanna 292
Potamianou, Hera 69
Poth, Christian H. 203
Potinteu, Andreea E. 292
Potts, Rosalind 354
Prehn, Kristin 293
Prell, Rebecca 294
Prochnow, Astrid 12, 295
Protze, Jette 181
Pruessner, Luise 295
Pucher, Magdalena 296
Pulm, Claudine 297
Puta, Christian 339

Q

Qiu, Ruyi 49
Quevedo Pütter, Julian 298

R

R. Schweinberger, Stefan 389
Raab, Florian 43
Rack, Oliver 169
Radev, Stefan 144
Radloff, Philipp 298, 347
Radovic, Tara 299
Radscheidt, Monique 365
Radvansky, Gabriel A. 30
Raettig, Tim 300
Ramscar, Michael 416
Rapp, Michael 316
Rapp, Michael A. 260
Rathgeber, Finn 300
Rausch, Manuel 149, 301
Rebholz, Tobias R. 158, 302
Reck, Corinna 97, 241
Redepenning, Tim 302
Reger, Maximilian 303
Reichensperger, Julia 258
Reimann, Daniel 304
Reips, Ulf-Dietrich 356
Reis, Moritz 304
Render, Anna 256, 305
Rendes, Reka 306
Renerte, Baiba 423
Rey-Mermet, Alodie 183, 306
Richter, Jasmin 128
Richter, Michael 307
Richter, Tobias 70
Riemer, Martin 25, 59, 166, 308
Rieskamp, Jörg 350
Rinkenauer, Gerhard 354
Rocabado, Francisco 265
Roden, Ingo 376
Rodríguez, Alejandra 402
Roembke, Tanja 22, 308, 357
Röer, Jan Philipp 181, 309
Rohr, Michaela 138, 309
Rolfs, Martin 189
Rolison, Jonathan 186
Rolke, Bettina 89, 148, 242
Rosner, Agnes 350
Roßkopf, Sarah 310
Roth, Leopold 254
Roth, Volker 145
Rothen, Nicolas 183, 212, 306, 315
Rothenberg, Elia Samuel 311
Rothensee, Matthias 236
Rothermund, Klaus 11, 35, 128, 137, 268, 312, 314
Rothkopf, Constantin A. 20, 234, 312
Röttger, Eva 174, 313
Rottleb, Dana Gudrun 146
Rozek, Robert P. 79
Ruci, Viktoria 142
Rudolph, Matthäus 314
Rueckl, Jay 330
Rufo, Alessandro 371
Ruge, Hannes 45
Ruiz-Rizzo, Adriana 365
Ruiz-Rizzo, Adriana L. 339
Rummel, Jan 150, 212, 376
Rummer, Ralf 100
Rupprecht, Sven 247
Russwinkel, Nele 314
Ruttorf, Michaela 259

S

Sachdeva, Chhavi 315
Sachs, David Florian 316
Sadedin, Nassim 316, 423
Sadeghi Talarposhti, Maryam 317
Sadus, Kathrin 150
Said, Nadia 34, 141, 224, 292, 318, 325
Saied Taha, Mais 232
Sakaki, Michiko 319
Sakata, Chifumi 319
Sakiri, Adem 227
Sampaolo, Erika 250
Sanwald, Simon 320
Sarıçiçek, Simge 320
Sauseng, Paul 116
Sauter, Marian 321, 367
Scaliti, Eugenio 371
Schaaf, Moritz 322
Schacht, Anne 253
Schack, Thomas 177
Schad, Daniel 316
Schad, Daniel J. 423
Schäfer, Anna Johanna 322
Schäfer, Franziska 19, 164, 174, 323, 393
Schäfer, Michael 379
Schaper, Marie Luisa 154, 324
Scharlau, Ingrid 17, 39
Scheibehenne, Benjamin 349
Scheller, Meike 324
Schenk, Charlotte 325
Schenk, Thomas 387, 410
Schepens, Job 326
Scherag, André 339
Scherbaum, Stefan 152
Schils, Ludivine 326
Schiltenwolf, Moritz 372
Schleicher, Daniel 95, 168, 327
Schlicker, Nadine 328
Schlien, Annette 329
Schlittmeier, Sabine 211
Schmalbrock, Philip 148, 269, 329, 360
Schmalz, Xenia 15, 142, 228, 277, 330
Schmid, Petra 419
Schmidt, André 145
Schmidt, Eike A. 69
Schmidt, Markus 331
Schmidt, Stephanie 332
Schmidt, Teresa 330
Schmieder, Claudia 124
Schmitterer, Alexandra 332
Schmitz, Laura 7, 333
Schmitz-Koep, Benita 193
Schneider, Iris 113
Schneider, Nicola 334
Schnieders, Bastian 298
Schnuerch, Martin 219
Schoemann, Martin 152
Scholten, Florian 335
Schon, Phio 309
Schönfeldt-Lecuona, Carlos 188
Schönung, Désirée N. 335
Schöpper, Lars-Michael 336
Schorn, Robert 337
Schramm, Isabelle 67
Schramm, Severin 61
Schrank, Andreas 337
Schreiner, Marcel 338
Schrenk, Simon 365
Schrenk, Simon J. 339
Schrills, Tim 339
Schroeger, Anna 340
Schröger, Erich 381
Schroter, Franziska 341
Schubert, Torsten 85, 210, 217, 292, 299, 317
Schubö, Anna 390
Schubotz, Ricarda I. 56, 153, 341, 377
Schuch, Stefanie 258, 342
Schuetz, Immo 37
Schüler, Anne 115
Schulte-Mecklenbeck, Michael 60
Schultze, Thomas 342
Schulz, Luisa 343
Schulze, Katrin 295
Schumacher, Lea 318
Schütt, Emanuel 344
Schütz, Alexander 63
Schütz, Christoph 302, 344, 355
Schütz-Bosbach, Simone 128
Schützhofer, Bettina 300
Schwabe, Lars 129
Schwan, Stephan 280, 283
Schwarz, Katharina 345
Schwarz, Mira 345
Schwarzbach, Jens 8, 83, 276, 346, 369
Schwarze, Sina 7, 347
Schwarzer, Gudrun 33, 105, 388
Schweinberger, Stefan R. 205
Schweizer, Martin 316
Schweppe, Judith 100, 296, 298, 347
Sebanz, Natalie 115
Sedaghatgoftar, Nasrin 348
Seibold, Verena 349
Seidler, Hannah 349
Seitz, Florian 350
Selb, Peter 175
Selvan, Rosari N. 341
Sen, Pritha 193
Senger, Tobias 351
Sengewald, Marie-Ann 121
Senoussi, Mehdi 140
Sense, Florian 351, 395, 420
Sepehry, Amir Ali 261
Seubert, Olivia 352
Shaki, Samuel 353
Shanks, David 354

Sharma, Nikita Rajendra 354
Shechter, Anat 167
Shen, Zixin 355
Shevchenko, Yury 356
Shing, Yee Lee 105
Shylivska, Yaryna 100
Siebertz, Markus 83, 356
Siegel, Max 281
Siegelman, Noam 330
Siestrup, Sophie 341
Simonetti, Matilde Ellen 22, 357
Singh, Tarini 358
Siol, Jasper 113
Skeide, Michael A. 170
Smela, Patrick 358
Smith, Elke 359
Soballa, Paula 360
Soch, Joram 170
Soemer, Alexander 360
Sojer, Christian 332
Sollmann, Nico 61
Sommer, Aldo 270, 361
Sonne, Trine 208, 362
Sørensen, Thomas Alrik 363
Sorg, Christian 193
Soukup, Madeleine 248
Söylemez, Sinem 363
Spannagl, Celine 47
Spektor, Mikhail 273
Sperl, Laura 364
Spitz, Andreas 175
Spitz, Ramona 181
Spitzer, Markus 374
Sprengholz, Philipp 365
Srihari, Vinod H. 145
Srowig, Annie 365
Stahl, Christoph 235
Stahlmann, Jens 170
Standke, Isabel 153, 377
Stankiewicz, Rajmund 126
Starcke, Katrin 294
Stärz, Felix 310
Stasch, Sophie-Marie 366
Steendam, Tabitha S. 214
Stefan, Angelika 367
Stefani, Maximilian 155, 321, 367
Steffens, Noelle 328
Stegemann, Manuel 166
Steinecker, Isa 166
Steiner, Elisabeth 132
Steinmassl, Konstantin 368
Stelzel, Christine 260
Stenner, Max-Philipp 35
Stephan, Alice 369
Stephan, Denise 104, 195, 326
Stepper, Madeleine 148
Sterner, Elisabeth 14, 87, 383
Sterner, Elisabeth Friederike 369
Stocco, Andrea 141
Stoinski, Laura M. 370
Strachan, James 371, 372
Straub, Elisa 195
Straub, Elisa Ruth 372
Streitberger, Carolin 373
Strelow, Frederike 374
Strittmatter, Younes 374
Strivens, Amy 375
Strobach, Tilo 155, 191, 215, 433
Studte, Sara 376
Stuff, Leonardo 181
Stump, Annika 376
Stuyck, Hans 243
Sui, Jie 324
Sundermeier, Maren 377
Sweldens, Steven 162
Symeonidou, Nikoletta 22, 335, 378
Szollosi, Aba 93, 378

T

Taghizadeh, Bahareh 120
Taha, Mais 231
Tahal, Vivien 379
Takáts, Anna 36, 194
Tanner, Carmen 423
Tannert, Swantje 365
Tanyas, Hilal 22, 380
Tariq, Mohammad 380
Tast, Valentina 381
Tatai, Fabian 312
Tavera, Felice 381
Taylor, Jack 382
Tefertiller, Zachary 383
Teigeler, Janna 386
Tempel, Tobias 331
Tena Garcia, Yanina E. 383
Tenenbaum, Joshua 281
Tesch, Jennifer 131
Tesio, Annika 53
Teuber, Alissa 309
Theis, Hendrik 359
Thielen, Hella 384
Thoma, Volker 385
Thornton, Ian M. 390
Thürmer, J. Lukas 24, 386
Timm, J. David 280
Tobler, Philippe N. 268
Tonn, Solveig 322, 386
Topçu, Meymune 387
Treff, Lara 309
Trempler, Ima 153, 377
Trumpp, Natalie 184
Tschech, Karen 387, 410
Tsenkova, Nikol 388
Tsuchiya, Ayaka 389
Tufft, Miles 7, 389
Tünnermann, Jan 17, 324, 390

Türk, Dilara Deniz 391
Turtleton, Bert 427
Tuts, Nora 384
Tuzsus, Deniz 359
Twadarski, Mathias 121
Tyralla, Sandra 261

U

U.Pfeuffer, Christina 104
Ueda, Yoshiyuki 319
Ufken, Emily 391
Ugnivenko, Polina 59
Ülker, Oktay 392
Ulloa, Roberto 175
Ullsperger, Markus 68
Ulrich, Martin 184
Ulrich, Rolf 45, 64, 99, 222, 249
Undorf, Monika 67, 164, 174, 268, 323, 393
Ungermann, Paul 275, 393

V

van de Par, Steven 310
van den Broek, Gesa 394
Van den Bussche, Eva 243
Van der Biest, Mathias 395
van der Velde, Maarten 5, 31, 61, 394, 395, 396
van Eimeren, Thilo 359
van Leeuwen, Cees 173
van Rijn, Hedderik 5, 61, 395, 396, 420
Vangkilde, Signe 55, 384
Vangyia, Ádám 36
Varkentin, Ekaterina 224, 397
Várkonyi, Gergő 36
Ventura-Bort, Carlos 316
Verbeke, Pieter 140, 397
Verbruggen, Frederick 395
Verguts, Tom 397, 398
Verschooren, Sam 395
Vingron, Naomi 60
Vo, Melissa 37, 60, 177, 263, 264, 391
Vo, Melissa L.-H. 419
Vo, Melissa Lê-Hoa 311
Vöge, Janne 399
Vogel, Ludwig 177
Vogel, Melanie 400
Vogel, Vera 399
Vogl, Lena 400
Volberg, Gregor 276, 303, 401
Vollrath, Mark 25, 212, 256, 374, 406
von Brachel, Ruth 166
von Castell, Christoph 417
von Helversen, Bettina 40, 159, 186, 350
von Perponcher, Elena 289, 402
Voormann, Anne 402
Voß, Andreas 334
Voss, Andreas 121, 144, 376, 403
Voudouris, Dimitris 124, 234, 269, 404
Vrabie, Oleg 303, 404

W

Wachsmann, Fabian 404
Wagner, Alexander F. 423
Wagner, Johanna 61
Wagner, Ullrich 405
Wahn, Basil 7, 406
Walter, Helene 406
Walter, Larissa 407
Wang, Gongting 176
Wang, Jia-Shun 408
Wang, Yi 111
Wang, Zhiyan 408
Ward, Jamie 315
Watson, Lynn 409
Weber, Andrea 410
Weber, Stefanie 387, 410
Wechsler, Theresa F. 330
Wegrzyn, Martin 411
Weicker, Merle 344
Weidler, Carmen 412
Weigelt, Matthias 57, 137, 417
Wein, Simon 369
Weis, Patrick 413
Weißgerber, Sophia C. 100
Weitzer, Anna Kristin 289
Welkenhuyzen, Lies 384
Wen, Wen 77
Wendt, Charlott 413
Wendt, Mike 258, 293, 414, 433
Wendt, Sophia 292
Wenger, Elisabeth 415
Wentura, Dirk 28, 138, 282
Werkle-Bergner, Markus 415
Werner, Juliane 416
Wernicke, Martina 231
Werwach, Annika 170
Wessels, Marlene 417
Wetzel, Nicole 88
Weymar, Mathias 316
Whelan, Emily 315
Wibail, Alain 384
Wickemeyer, Carolin 417
Widmann, Andreas 88, 381
Wiedemann, Katharina 200
Wiese, Eva 126, 127, 190, 209, 284, 418
Wiesing, Michael 69
Wiesmann, Sando 264
Wiesmann, Sandro L. 419
Wiesmann, Sandro Luca 311
Wilbrink, Marc 27, 337
Willardt, Robin 419
Wilschut, Thomas 61, 396, 420
Wilts, Sarah 421
Winkler, Sven 428
Winter, Alice 421
Wirth, Laura 316
Wirth, Laura A. 423

Wirth, Robert 422
Wirtz, Philipp 159
Witt, Nicole 423
Wittbecker, Pia 253
Witte, Otto W. 339
Wögerbauer, Elisabeth Maria 424
Wöhner, Stefan 170
Woitzel, Johanna 164
Wolbers, Thomas 432
Wolf, Alexandra 425
Wolf, Tabea 425
Wolff, Christian 59, 308
Wolkersdorfer, Maximillian 173
Woods, Scott W. 145
Wühr, Peter 426
Wulff, Dirk 169
Wunderlich, Klaus 193
Würbach, Lena 246
Wurm, Moritz 53, 427
Wykowska, Agnieszka 285

X

Xie, Ning 428
Xie, Siying 427

Y

Yamasaki, Daiki 157
Yeh, Lu-Chun 429
Yildiz, Bahtiyar 430
Yu, Lin 177

Z

Zahedi, Anoushiravan 153, 377
Zahn, Carmen 169
Zangemeister, Maria 389
Zehetleitner, Michael 149
Zemp, Martina 241
Zercher, Désirée 430
Zgonnikov, Arkady 252
Zhao, Fang 431
Zheng, Kristine 281
Zhou, Ruojing 432
Zhou, Yuefang 213
Ziegler, Johannes 244
Zilker, Veronika 156, 432
Zimmer, Claus 87
Zimmer, Ulrike 433
Zimmermann, Eckart 69
Zimmermann, Marius 8, 404, 434
Zimprich, Daniel 425
Zirker, Angelika 279
Zsido, Andras 435
Zsido, Andras N. 44
Zsidó, András N. 36
Zsido, Andras Norbert 187
Zsidó, Dr. András Norbert 430

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