65th TeaP in Trier

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Keynotes

Registered Reports and the future of open science in psychology

Chris Chambers

Cardiff University

Registered Reports are a form of preregistered empirical article that aims to eradicate publication bias and reporting bias by performing peer review before research commences. Publishability is then decided by the scientific validity of the research question and quality of the methodology, and never based on the results. In this talk I provide an update on the progress of Registered Reports since they were first launched in psychology over 10 years ago, including adoption by more than 300 journals and early evidence of positive impacts on the field. I will also discuss “Registered Reports 2.0” in which the format is transcending journals altogether. 2021 witnessed the creation of the Peer Community in Registered Reports (PCI RR): a free, non-commercial platform that coordinates the peer-reviews of RR preprints (https://rr.peercommunityin.org/about/about). Once a submission is accepted following peer review (or, in PCI terms, “recommended”), the revised manuscript is posted at the server where the preprint is hosted, and the peer reviews and recommendation of the preprint are posted at the PCI RR website. PCI RR is also joined by a growing fleet of “PCI RR-friendly” journals that accept the recommendations of PCI RR without further peer review (https://rr.peercommunityin.org/about/pci_rr_friendly_journals), giving the authors the power to choose which journal, if any, will publish their final manuscript. By reclaiming control of the peer review process from academic publishers, PCI RR offers a route for ensuring that Registered Reports are made as open, accessible, and rigorous as possible, while also creating a future in which academic publishers will need to add genuine value to the community in order to survive.

Presentation type: Oral presentation / Talk

Session: Keynote III

Active inference and sentient behaviour

Karl Friston

Wellcome Trust Centre for Neuroimaging, Insitute of Neurology, University College London

How can we understand ourselves as sentient creatures? And what are the principles that underwrite sentient behaviour? This presentation uses the free energy principle to furnish an account in terms of active inference. First, we will try to understand sentience from the point of view of physics; in particular, the properties that self-organising systems – that distinguish themselves from their lived world – must possess. We then rehearse the same story from the point of view of a neurobiologist, trying to understand functional brain architectures. The narrative starts with a heuristic proof (and simulations of a primordial soup) suggesting that life – or biological self-organization – is an inevitable and emergent property of any dynamical system that possesses a Markov blanket. This conclusion is based on the following arguments: if a system can be differentiated from its external milieu, then its internal and external states must be conditionally independent. These independencies induce a Markov blanket that separates internal and external states. Crucially, this equips internal states with an information geometry, pertaining to probabilistic beliefs about something; namely external states. This free energy is the same quantity that is optimized in Bayesian inference and machine learning (where it is known as an evidence lower bound). In short, internal states will appear to infer – and act on – their world to preserve their integrity. This leads to a Bayesian mechanics, which can be neatly summarised as self-evidencing. In the second half of the talk, we will unpack these ideas using simulations of Bayesian belief updating in the brain and relate them to predictive processing and sentient behaviour.

Keywords: active inference, autopoiesis, cognitive, dynamics, free energy, epistemic value, self-organization.

Presentation type: Oral presentation / Talk

Session: Keynote II

Allocating attention and selecting an action across space and time

Dominique Lamy

Tel Aviv University

What we pay attention to largely determines the contents of our experience. It is therefore not surprising that so much research effort has been expended to determine the rules by which we allocate our attention. Current research on this topic converges on two tenets. The first is that where we allocate our attention next depends on the combined influence of stimulus salience, our goals as well as what we have recently attended (selection history) on a general priority map - with the influence of selection history accounting for a large part of the influence previously attributed to goals. The second is that at any given moment, attention is automatically shifted to the location with the highest priority on that general map. In this talk, I will present work that mitigates both assertions. In the first part, I will claim that theories that have developed around the concept of a priority map have typically ignored insights from research on temporal attention, and therefore do not fully account for how information is dynamically prioritized in space and time. I will present evidence supporting the Priority Accumulation framework (PAF), which provides an account of how temporal attention interacts with the priority map to determine how we allocate our attention in a dynamic world. In the second part, I will claim that the influence of selection history in attentional guidance is often overestimated in current research, because it typically fails to acknowledge the role response selection.

Presentation type: Oral presentation / Talk

Session: Keynote I

Symposia

Touch in context: from the body to the external world

Belkis Ezgi Arikan, Dimitris Voudouris

Justus Liebig University Giessen

Touch is one of the most critical senses, as it provides information about the state of our own body and of the external world. For instance, tactile input from different surfaces influences how humans interact with these surfaces. Meanwhile, tactile sampling and processing is also influenced by our movements. In the real world, touch can be directed to different textures, surfaces and objects, with different goals in mind (from contacting a texture to exploring a surface to changing an object's position). The proposed symposium will discuss recent findings on the interplay between touch and movement in naturalistic settings. More specifically, we will address how tactile processing is modulated by various tactile inputs, during motion, and under different tasks. Dione Mariama will talk about how humans explore natural textures and how mechanoreceptive afferents transform physical inputs into the perception of touch. Luigi Tamè will present evidence that distortions in the perceived distances between tactile stimuli on the hand can also be observed in early somatosensory and motor areas. Focusing on natural object manipulation, Benoit Delhaye will then address how tactile interactions between fingertips and objects provide grasp stability. Alessandro Moscatelli will talk about everyday interactions between hand movements and touch, and how optimal integration models can predict tactile illusions of motion. Finally, Ezgi Arikan will discuss the role of approach-avoidance goals on tactile sensitivity when moving towards and away from objects in a virtual reality environment.

Presentation type: Oral presentation / Talk

Session: Touch in context: from the body to the external world

Perceiving and understanding cues in others' actions

Shaheed Azaad

Central European University

Contemporary action understanding research has shown that cues guide our interpretation and prediction of others' actions. This group of talks seeks to show the

range kinds of cues that shape our action understanding, and the mechanisms by which they do so.

Mechanisms underlying forward simulation in action understanding.

Dr Francesco Iani – Universita Di Torino.

During action observation, people represent the observed action unfolding in time and this representation speeds up the recognition of the next action states compared to the backward states. In this talk we will discuss the nature of this mental stimulation as well as the possible mechanisms underlying action anticipation. We hypothesize that there are at least two processes: (1) an action prediction mechanism, by which people simulate the next states of the observed action through a representation of the action unfolding in time; (2) a goal prediction mechanism, by which people infer the final goal of the observed action based on the physical properties of the object.

Cues to other's higher-order mental states inform action prediction

Dr Katrina McDonough – University of Aberdee

How we perceive and interpret the actions of others depends not only on action observations, but also action predictions. Here we show that cues to other's higher-order mental states inform predictions of their upcoming behaviour and guide action perception.

Communication through teaching: How expert pianists and novice students interact through sound

Atsuko Tominaga – Central European University

In my talk, I will discuss how expert pianists produce and adapt teaching signals through their performances and how novice students detect such cues by listening to teachers' performances

Others' social contexts guide our predictions of their actions

Dr Shaheed Azaad – Postdoctoral Researcher, Central European University

Recent work on action prediction has shown that contextual, non-kinematic, cues can inform our predictions of others' actions. In this series of experiments, we show that others' social contexts similarly guide action prediction.

Presentation type: Oral presentation / Talk

Session: Perceiving and understanding cues in others' actions

Spatial Compatibility Effects: Old effects, new ideas and a bright future

Pamela Baess [1], Christian Böffel [2]

[1] University of Hildesheim, [2] Work and Engineering Psychology, RWTH Aachen University

Everyone knows what spatial compatibility effects are. But how can we use them to understand human cognition? This symposium brings together different (spatial) compatibility tasks in order to highlight how they are used in ongoing research. Our goal is to reflect on past research and inspire new ones utilizing one of psychology's most cherished phenomena.

Presentation type: Oral presentation / Talk

Session: Spatial Compatibility Effects: Old effects, new ideas and a bright future I & II

Experimental Engineering Psychology

Martin Baumann [1] , Stefan Brandenburg [2]

[1] Ulm University, [2] Anwendungsorientierte Kognitionspsychologie Abt. Allgemeine Experimentelle Psychologie Johannes Gutenberg-Universität Wallstrasse 3 55099 Mainz

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 symposium aims to highlight the value of the experimental approach in the applied setting of Engineering Psychology and Human Factors by presenting recent research projects and results in various application fields. The first talk by Nadine Schlicker and Markus Langer presents findings of a study that aimed to compare justice perceptions of decision recipients between human and automated agents and to investigate how these perceptions are affected by explanations. The second talk by Veronica Hoth, Maria Ivanova, and Stefan Brandenburg examines the impact of three different Design Patterns of a cookie banner on participants' ratings of user experience and trust. The third talk by Markus Gödker, Tim Schrills, and Thomas Franke presents an electric vehicle driving simulator experiment that investigated the drivers' mental representation of energy consumption, its development over time, and its link to eco-driving. The fourth talk by Luisa Heinrich and Martin Baumann examines the effects of different interaction strategies on the take-over behavior in automated vehicles. The fifth talk by Elisabeth Wögerbauer addresses the effect of dissociating viewpoints through the use of camera-monitor systems on time-to-contact estimation. The results of a laboratory experiment in which the horizontal position of the camera was varied will be reported. The sixth talk by Matthias Arend and Verena Nitsch investigates situation awareness during telemanipulation. In the presented experiment they study the situation models of human operators in a situation in which they control a complex robotic system with various end-effectors at a distance.

Presentation type: Oral presentation / Talk

Session: Experimental Engineering Psychology

Pain and Aging

Angelika Dierolf

Department of Behavioural and Cognitive Sciences, Research Group: Stress, Pain, and Gene-Environment Interplay; University of Luxembourg, 11, Porte des Sciences, L-4366 Esch-sur-Alzette

The aging population is disproportionally affected by pain and its consequences. Aging is known to affect neurobiological aspects of pain perception and has been associated with a deterioration of descending pain inhibitory mechanisms. However, little is known about whether cognitive pain modulatory mechanisms are preserved in the older age. Here, we present a series of studies on cognitive and situational factors influencing pain processing and the efficacy of cognitive pain modulation on the behavioral and (neuro)physiological level, focusing on underlying neural mechanisms to gain insight in the changes of the aging brain associated with pain processing and pain modulation. Ana María González Roldán will start presenting data from several electrophysiological studies examining how aging and chronic pain may mutually contribute to enhanced pain perception. Further expanding on chronic pain, Joukje Oosterman will present a study on the underlying neural mechanism of loss of control over pain in aging, a predictor for future chronic pain. She will focus on age-related changes in function and EEG-connectivity in brain circuits involved in pain processing in relation to top-down cognitive modulation of pain control. Turning to distraction from pain as a top-down inhibitory process, Marian van der Meulen will discuss the relationship between functional connectivity during resting state and the distraction effect size in younger and older healthy adults. The role of executive functions and age-related cognitive decline in distraction from pain is addressed by Angelika Dierolf, presenting results of an EEG study. Finally, Sven Philipsen will discuss the impact of acute stress on the efficacy of distraction from pain in young and older adults.

Presentation type: Oral presentation / Talk

Session: Pain and Aging

Automation while driving – current problems and approaches

Arnd Engeln

Hochschule der Medien, Stuttgart

Automated driving continues to approach reality. Research in traffic psychology in this area focuses on how to achieve a high level of acceptance and thus willingness to buy by designing these vehicles and their behavior accordingly. Or to put it more positively: How do these vehicles have to be designed to be pleasant and positive for passengers and other human road users? The first paper is about using an adaptation of driving behavior of automatic cars to show the passenger that the vehicle understands and takes into account the possible criticality of a situation. The second paper examines the extent to which the behavior of automated vehicles could lead to positive effects on the behavior of human drivers in the sense of model learning, and thus increase road safety. The third and fourth contributions deal with interior design for passengers of automated vehicles, certainly a key way to increase comfort. This is complemented by a contribution that examines possible use cases for automated driving in the context of one's own family, in the sense of a requirements analysis. Finally, a very special automation function, the automatic emergency call, is examined from the perspective of accident research, thus concluding the overview of current problems of automation in driving.

Presentation type: Oral presentation / Talk

Session: Automation while driving – current problems and approaches

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The relative self: Social comparison and its implications for cognition, well-being and self-construal

Julia Englert

University of Münster

How we view and evaluate ourselves is thought to play a crucial role in our well-being and in the development and maintenance of psychopathology. Drawing upon information from memory and our current environment, judgment is relative to comparison standards. Therefore, self-construction is subject to contextual and situational influences. Social comparison is the most salient and most-widely researched standard informing self-construal. Yet, the complex effects of social comparison are still not well understood. The research presented in this symposium aims to systematically investigate the comparison process and its components, as well as its affective, cognitive and behavioural consequences. Our contributors draw on a wide array of experimental paradigms, including false feedback manipulation, trauma film exposure, comparison orientation interventions, comparison sample manipulation, and a novel paradigm displaying the (mis)fortunes of others. They report effects of social comparisons on a variety of outcomes, including on self-and other-judgments, positive and negative affect, envy and schadenfreude, prosocial behaviour, cognitive orientation, goal-directed action and psychological distress. Together, our research on comparison processes addresses questions from the areas of social psychology, sports psychology, neuroscience and psychopathology, for which we will consider translational implications.

Presentation type: Oral presentation / Talk

Session: The relative self: Social comparison and its implications for cognition, well-being and self-construal

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Current directions in free-choice paradigms: What we can learn from giving more control to the participant

Kerstin Fröber

Universität Regensburg

In experimental psychology, researchers usually aim at controlling all aspects of the experimental situation. For some research questions, however, it is necessary to give up part of that control and to increase the degrees of freedom on the participant side. In this symposium, we present different research projects using a variety of free-choice paradigms that provide new insights from and about participants' decisions.

Presentation type: Oral presentation / Talk

Session: Current directions in free-choice paradigms I & II: What we can learn from giving more control to the participant

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Tell me and talk to me – the influence of language on goal-directed performance

Miriam Gade

Medical School Berlin

In the present symposium, we plan to bring together different perspectives of how language influences goal-directed performance in mostly language unrelated tasks. Language influences are present either because of instructions, automatic reliance on or because of individual preferences. The contributors to this symposium will present work investigating language(s) as an instructional tool, language as help for or hindrance of cognitive flexibility, language(s) as performance-regulating tool in single subject and co-agents' settings and address measurement of inner speech and its impact on basic cognitive performance. Given the recently revoked interest in the connection between language, cognition and performance, this symposium aims at bringing together different research endeavours and stipulate discussions and cooperations among involved researchers.

Presentation type: Oral presentation / Talk

Session: Tell me and talk to me – the influence of language on goal-directed performance

Misinformation Research - Quo Vadis?

Michael Geers

Max Planck Institute for Human Development

Misinformation poses a serious challenge to societies and democracies worldwide. This symposium brings together novel methodological approaches and empirical insights on the psychology of misinformation, but also critically discusses current research practices and paradigms. Talk 1 (Lena Nadarevic, University of Mannheim) introduces an experiment testing the effectiveness of warnings against the truth effect in a simulated social media environment. Talk 2 (Mubashir Sultan, Max Planck Institute for Human Development) presents a meta-analysis on news veracity judgments of misinformation. It will aggregate previous findings, highlighting pertinent trends for the predictors of misinformation susceptibility, including demographics (e.g., age, political identity), analytical thinking, partisan bias, and the illusory truth effect. Talk 3 (Michael Geers, Max Planck Institute for Human Development) introduces a task analysis that identifies the processes required for users to share true content online. It also highlights some cognitive and motivational challenges for sharing true content, maps interventions, and identifies open research questions. Finally, a panel discussion critically discusses the current state of misinformation research, including reflections on the ecological validity of experimental paradigms and the extent to which some work on misinformation has come short of building on previous psychological research. Next to the speakers of talks 1-3, the discussion features Pia Lamberty, co-director of the Center for Monitoring, Analysis and Strategy (CeMAS). She studies how people at the center of society are radicalized by conspiracy theories and reject democracy altogether, and her real-world experience may offer a new perspective that many experimental psychologists do not have.

Presentation type: Oral presentation / Talk

Session: Misinformation Research - Quo Vadis?

Cognitive building blocks in social contexts

Carina G. Giesen [1], Anna K. Kuhlen [2], Miles Tufft [3]

[1] Friedrich-Schiller-Universität Jena, [2] RWTH Aachen University, Institute of Psychology, Aachen, Germany, [3] University College London

Behaviours and their underlying cognitive mechanisms come into action not in isolation but in a world that is naturally social and rich in context. Human behaviour is situated within an ongoing and dynamic interplay between cognitive processes and the contexts in which they operate. This symposium sets out to explore the relationship between higher order social factors and the building blocks of human cognition. We will share

evidence that demonstrates the sensitivity of behavioural effects to context, with a focus on social context modulations. We will draw on research from task instruction, attentional capture and gaze, collaborative visual search, and joint action control research. Bringing together a variety of researchers across different fields in cognitive psychology, we aim to show the boundary conditions under which social contexts impact on (joint) task performance, reflected in benefits or costs.

Presentation type: Oral presentation / Talk

Session: Cognitive building blocks in social contexts

Perception and Action in Sports

Iris Güldenpenning

Paderborn University

In different kind of sports, highly time-restricted situations require athletes to early anticipate actions of team members and opponents. Skilled athletes use different sensory modalities to predict upcoming situations. The first talk focuses on multisensory integration in anticipation. For the anticipation of sporting actions, not only sensory perceptions play a role, but also information about the context (e.g. the score, the position of a player on the field, preferences of an opponent). The second talk deals with the question of how different frequencies of head fakes performed by different basketball players affect the individual effectiveness of the head fake. The ability to inhibit an already planned action also plays an important role in sport, for example in order to avoid an injury or because an opponent has provoked an incorrect action through deception. In the third talk, a paradigmatic approach is reported to investigate response inhibition for the basketball jump shot. The fourth talk focuses on the relationship between response inhibition and expertise. The fifth talk explores the question of how prior mental training in the learning process of a complex action affects gaze behavior and motor performance.

Presentation type: Oral presentation / Talk

Session: Perception and Action in Sports

Modeling and experimental validation in real-life environments

Moritz Held [1, 2], Jochem Rieger [1]

[1] *University of Oldenburg,* [2] *University of Groningen*

Both psychological experimentation and (cognitive) models are established approaches to evaluate the safety, ergonomics, and usability of Human-machine-interactions in real-life scenarios. However, they often excel at different stages in the scientific process. While psychological experiments are, for example, often used to critically assess the influence of cognitive processes in real-life environments, (cognitive) models are best used to inform how said processes influence or interact with the task environment. In real-life scenarios, the interplay between models and experimentation can be especially helpful due to the challenges that arise when evaluating these models, for example, the individual differences between humans. In this symposium, we bring together research from both experimental psychologists as well as (cognitive) modelers to foster an integrated evaluation of applied research environments that combines these methods. In the first talk, Biebl & Bengler will present their work on modeling intersection-related collision due to impaired visual ability. The second talk by Russwinkel will discuss anticipatory models for real-life decisions. The third talk summarizes an evidence accumulation model of a driving task. The fourth talk by Baumann et al. showcases several examples in modeling cooperation in traffic while highlighting the potential difficulties that can arise in the process. The last talk by Held et al. presents an ACT-R model, which attempts to explain an often-observed behavior of decreased driving performance in mundane driving environments and why this effect can be reversed by a low-effort mental task. The symposium will end with a moderated discussion between the speakers and the audience.

Presentation type: Oral presentation / Talk

Session: Modeling and experimental validation in real-life environments

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Strategic information search in inferences and decisions under uncertainty

Linus Hof

TUM School of Management, Technical University of Munich

Core capacities of the mind like reasoning and decision making are exercised as responses to specific information-processing tasks. It is often assumed that these responses are strategic, taking into account resource limitations and trade-offs between the costs and quality of information-processing mechanisms. Yet, when the input information is missing, search must become part of the mind's strategic response. This symposium features two tasks, inductive inferences and decisions under uncertainty, to highlight the strategic nature of information search (sampling). Marlene Hecht shows that if people consult their social network to make uncertain inferences, their search through the network is best described as sequential, limited, and less impactful for online contacts. Kevin Tiede presents work indicating that people increase their sampling effort to alleviate informational imbalances between described and experienced choice options. Linus Hof and Mikhail Spektor expand the symposium's view on decisions from experience, demonstrating, for example, how sampling and integration strategies can interact to produce distinct choice patterns and

psychoeconomic profiles. Doron Cohen concludes by presenting a simplified drift diffusion model. He uses the model to reconsider basic assumptions of sequential sampling approaches, which treat information search as an evidence accumulation process. As a whole, the collection of talks suggests that our explanations of cognitive capacities and the phenomena they produce can be improved by postulating how these capacities implement a strategic information search.

Presentation type: Oral presentation / Talk

Session: Strategic information search in inferences and decisions under uncertainty

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Spatial Navigation

Sein Jeung, Klaus Gramann

Technical University of Berlin, Berlin, Germany

This session puts together research works that are central to understanding spatial navigation and its neural underpinnings. The talks will introduce the neural basis of spatial navigation in animal and human research along with new insights from studies coupling mobile brain imaging with virtual reality (VR) and real-world tasks as well as works on geometric representations of space and the impact of aging on navigation abilities. Different navigation strategies such as path integration and landmark-based navigation are supported by neural populations in the medial temporal lobe [1]. Electrophysiology recorded in animals can be used to establish, validate, and refine computational models that are linked with testable behavioral predictions on how space is represented and remembered. Methodological advances such as immersive VR and mobile brain imaging enable the translation of key findings from animal research on the aforementioned brain regions to humans. The use of VR in spatial navigation research allows for flexible manipulation of space in a way that is not possible in physical space, while providing participants with rich, naturalistic stimuli [2,3]. By enabling participants to make use of a natural mode of locomotion (e.g., walking through physical space), mobile brain imaging methods such as mobile EEG [2,5] afford the investigation of how body-based information influences navigation strategies. A better understanding of how humans navigate through space is of great applied value as they inform us about the nature of cognitive decline in older adults [4] and support development of effecient navigation aids [5].

Presentation type: Oral presentation / Talk

Session: Spatial Navigation

Computational psychiatry: Identifying the fine- grained behavioural mechanisms underlying symptoms in psychosis and internalising disorders

Franziska Knolle

Diagnostische and Interventionelle Neuroradiologie, Technische Universitaet Muenchen

Computational psychiatry provides a direct approach for the investigation and development of mechanistic explanations for psychiatric illnesses, through the mathematical description of processes underlying behaviour. Alterations in decision-making, a cognitive process relevant for the successful interaction with the environment, have been reported in disorders including psychosis, obsessive-compulsive disorder (OCD), and eating disorders, and have been linked to the development of symptoms. Importantly, we describe a transdiagnostic approach using similar tasks and models to show that specific alterations in mathematical parameters express disease-specific dysfunction and symptom associations. Kelly Diederen (King's College London) used a novel gamified task in conjunction with computational modelling to demonstrate that decision-confidence and belief-updating can be measured at scale using online assessment, and that these processes are altered in people at increased risk of psychosis. Elisabeth Sterner (LMU/TUM) will show that deficits in punishment learning in early psychosis are linked to increased forgetting and reduced confidence in policy selection using an Active Inference model of the Go/NoGo-Task. Pritha Sen (LMU/TUM) will present first-time imaging data investigating model-based (MB) and model-free (MF) decision making in OCD using hierarchical Bayesian modelling of the Two-Step task. Computational result show differences between patients and controls with links to symptom strength. Margaret Westwater (Oxford/Yale) will report data from both laboratory-based and online assessments of learning under uncertainty, which used computational modelling to demonstrate that impaired learning in individuals with eating disorders is linked to altered reward sensitivity. Franziska Knolle (TUM/Cambridge) will discuss the effect of dopaminergic treatment on probabilistic reward learning in OCD using Rescorla-Wagner-modelling, showing that exaggerated cingulate reward prediction errors in patients are remediated by dopaminergic modulation. This state-of-the-art symposium demonstrates that computational models of decision making provide mechanistic explanations for dysfunctions underlying three common psychiatric conditions: psychosis, OCD, and eating disorders, and may provide starting points for treatment development.

Presentation type: Oral presentation / Talk

Session: Computational psychiatry: Identifying the fine-grained behavioural mechanisms underlying symptoms in psychosis and internalising disorders

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How spatial are numbers?

André Knops

Université Paris Cité

The mental number line (MNL) as a metaphor for describing the spatially organized mental representation of numbers in long-term memory has a number of theoretical implications that refer to spatial-numerical associations (e.g. the Spatial Numerical Association of Response Codes [SNARC]), biases of spatial attention (attentional SNARC), or the involvement of transient stimulus representations in working memory. The current symposium brings together empirical works from leading European labs that put these notions to test. The talks are complementary in terms of methodology (e.g. reaction time experiments; line marking tasks; word categorization tasks; temporal order judgments tasks), investigated samples (healthy participants; neurological patients) and age range (Kindergarteners, adults) but jointly address the idea of a spatial representation of numbers from different perspectives. The common underlying theoretical framework will facilitate the exchange on limiting conditions of the MNL metaphor by transgressing disciplinary boundaries. This will help developing alternative theoretical frameworks by highlighting alternative mechanisms such as transient organizational principles in working memory, task-specific spatial response codes, or culturally mediated factors such as counting habits.

Presentation type: Oral presentation / Talk

Session: How spatial are numbers?

Sound Symbolism: Phenomena, Methods, and Psychological Processes

Anita Körner

University of Kassel

The term sound symbolism refers to the phenomenon that word form (e.g., the phonemes of which a word consists) and word meaning are non-arbitrarily related. For example, specific vowels have been shown to be associated with size, so that participants typically choose the word MIL (vs. MAL) to denote a small (vs. large) object (e.g., Sapir, 1929). Sound-symbolism has been shown across many of the world's major spoken languages as well as many sign languages. The present symposium will comprise talks that span several research areas in sound symbolism, comparing different semantic dimensions, different languages, and different psychological processes. First, cross-linguistic similarities in the association between phonemes and valence (Talk 1, Körner) as well as cross-linguistic differences in sound symbolic associations for size (Talk 2, Ćwiek) will be discussed. Additionally, the contribution of articulatory compared to acoustic properties of phonemes are examined by showing that valence sound symbolism partially relies on articulation (Talk 1, Körner), while frequently, both articulatory and acoustic features interact (Talk 3, Winter). Lastly, different methods for examining sound symbolism in the lab are discussed with an emphasis on unrestricted tasks, such as asking participants to generate pseudo-words to prevent (Talk 4, Rummer). Together with the talks, the integrative discussion will

facilitate a deeper understanding of how word form and meaning are related and which psychological processes drive sound symbolism. Ultimately, words reflect psychological functions and research on sound symbolism can reveal how the human mind uses ecological and psychological associations to represent meaning.

Presentation type: Oral presentation / Talk

Session: Sound Symbolism: Phenomena, Methods, and Psychological Processes

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Benefits of Practice Tests on Learning

Veit Kubik [1], Bernhard Pastötter [2]

[1] Julius-Maximilians-Universität Würzburg, [2] Department of Cognitive Psychology, University of Trier

Although typically used for assessment, tests are considered as one of the most effective learning techniques. Practice tests can be provided after the to-be-learned information (i.e., posttests) or beforehand (i.e., pretests). Both types of practice tests have been shown to enhance prior learning. In addition to this backward effect, posttests also enhance subsequent learning of newly presented information (i.e., the forward effect of testing). This symposium aims to present recent findings from various labs on the benefits of practice tests and to examine its underlying mechanisms. Kliegl et al. examined the benefit of pretests and how its magnitude is moderated by retention interval and the presence of interfering information. Shanks et al. examined the grain size hypothesis of posttests proposing that several tests of smaller amounts of information enhance long-term retention more than a single test on all information. Bencze et al. investigated event-related potential (ERP) correlates of repeated retrieval (vs. restudy) practice to specify the contribution of episodic recollection and post-retrieval evaluation processes to long-term recall success. Rummer et al. examined students' metacognitive accuracy for long-retention benefits of posttests compared to rereading and notetaking; they specifically used offline judgements of learning that are made independent of the current learning situation. Kubik et al. examined the forward effect of testing in visual-spatial learning and how the amount of proactive interference moderates its size. Finally, Pastötter et al. examined whether the forward effect of testing is immune to stress induced after encoding. Together, this symposium will provide insights on the underlying mechanisms of practice tests and its practical implications in educational settings.

Presentation type: Oral presentation / Talk

Session: Benefits of Practice Tests on Learning

New methodological approaches to measuring unconscious mental processes

Simone Malejka

University of Cologne

Can we detect regularities in our environment and adapt behavior accordingly in the absence of awareness? The demonstration of unconscious (implicit) cognition hinges on participants' unawareness of stimuli, processes, or products involved in a task. The gold standard is to establish an indirect-without-direct effect, that is, an uninstructed effect of a stimulus on behavior under conditions that preclude any effect of the stimulus on a response according to explicit instructions. This symposium will bring together researchers working on new methods tailored to investigate the possibility of indirect-without-direct effects. The first two talks will present novel indirect and direct measures for well-known experimental paradigms. Sascha Meyen will demonstrate a new test of reaction-time differences, which offers an improved indirect measure and provides evidence against unconscious processing in contextual cueing. In the area of priming, Thomas Schmidt will talk about a new theory of visibility focusing on the critical stimulus feature that generates the indirect effect and must be assessed in the direct measure. The final three talks will present new analyses for data that presumably show an indirect-without-direct pattern. These data often suffer from regression to the mean (RttM), defined as the statistical phenomenon that makes natural variation in repeated data look like real change. When direct measures are contaminated with measurement error, low awareness scores will tend to be followed by awareness scores closer to the mean. Itay Yaron will outline a solution to the RttM problem that uses a widely applicable bootstrapping algorithm based only on a small set of assumptions. Simone Malejka will present a method of true-score estimation based on the Bayesian principle of shrinkage, which corrects noisy data and can solve RttM and related measurement biases. Lastly, Zoltan Dienes will demonstrate how Bayes factors can provide evidence for (or against) one's theory in the presence of measurement error by testing an interval null hypothesis of zero awareness in post-hoc trial selection.

Presentation type: Oral presentation / Talk

Session: New methodological approaches to measuring unconscious mental processes

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Experimental Aesthetics Following Fechner's Conceptions

Maria Manolika, Barbara E. Marschallek, Thomas Jacobsen

Experimental Psychology Unit of the Helmut Schmidt University/University of the Federal Armed Forces Hamburg

With the publication of Gustav Theodor Fechner's Vorschule der Ästhetik, the year 1876 marks the beginning of Experimental Aesthetics, which is the second-oldest branch of

Experimental Psychology. In his major work, Fechner suggested the study of aesthetics "from below", applying empirical knowledge. To date, the Experimental Aesthetics enjoys a growing number of researches from different fields of Psychology. The present symposia, therefore, comprise contributions investigating a variety of domains including, for example, live performances, materials, and tattoos, Furthermore, questions of the influence of several stimuli's and individual's characteristics, including but not limited to complexity, memory resources, personality differences, and types of stimuli, are addressed.

Presentation type: Oral presentation / Talk

Session: Experimental Aesthetics Following Fechner's Conceptions I & II

Advice taking and beyond: Judgment formation via advice taking, sequential collaboration, and belief updating

Maren Mayer

Leibniz-Institut für Wissensmedien, Tübingen

When making decisions, individuals often receive advice from others and incorporate this advice into their own judgments and decisions-under certain conditions leading to increases in decision quality and confidence. Beyond the typical paradigm examining advice-based decisions, several research avenues emerged in recent years that rely on advice taking and extend the typical paradigm to various different tasks and contexts. In this symposium, we thus introduce several novel directions for advice taking and related research. The first contribution provides an overview of typical paradigms and findings of empirical studies on advice-based decisions conducted over the last 15 years in behavioral and organizational research. The second contribution describes a newly developed (largely) culture-fair estimation task that solely requires secondary school level as a basis for conducting between-culture comparisons of advice taking in Chinese and German students. The third talk will present an application of the advice taking paradigm to investigate social influence in moral judgments at the example of the asymmetric moral conformity effect. The fourth contribution addresses sequential collaboration, a process relying on consecutively improving contributions made by others in which previous contributions can be viewed as advice for later contributors. Some of the previous findings will be reassessed to complement the presentation of a novel statistical modeling approach for process-consistent analysis of judgment formation in part five. The final contribution addresses how people update their beliefs about the validity of effects when being confronted with various scientific evidence, which can be viewed as a form of advice.

Presentation type: Oral presentation / Talk

Session: Advice taking and beyond: Judgment formation via advice taking, sequential collaboration, and belief updating

How agents' cognitive processes shape self-determined information search and the resulting judgements and decisions judgements and decisions

Linda McCaughey

Heidelberg University

Cognitive-ecological approaches have emphasised the influence of the information sample on judgements and decisions. These information samples are often actively solicited and thus crucially influenced by the agent's cognitive processing and goals. This symposium will shed light on how these influences extend to judgements and decisions via the underlying information sampling process. Seidler will discuss how basic cognitive processes in number perception and integration impact economic judgement when information is acquired by sequentially sampling positive and negative numbers. Prager will highlight diagnosticity as a crucial determinant of sampling and judgement behaviour. In a personnel selection context, not only the characteristics of the information on the candidate, but also their interaction with characteristics of the target job profile determined information search, job-fit judgements and confidence. Taking up confidence, McCaughey will examine how accumulated evidence and subjective confidence are used to regulate the amount of sampled information and discuss potential ways of how the two interact. Niese tested the role of sampling in an evaluative conditioning context and will present findings demonstrating that people show a positive evaluative shift after sampling conditioned stimuli more (vs. less frequently), regardless of whether a stimulus is paired with positive or negative unconditioned stimuli. Importantly, this effect is moderated by people's sampling goals. Biella will explain how the exploration of the social environment strongly depends on whether the information search is interested (information is immediately rewarding conditionally on its pleasantness) or disinterested (information is accumulated for later use). How biased an information sample is depends on which of the two dominates the sampling process. The final discussion will engage the audience in a discussion about how these research questions and insights can be connected in the name of theory integration.

Presentation type: Oral presentation / Talk

Session: How agents' cognitive processes shape self-determined information search and the resulting judgements and decisions

Spatial changes over time: current developments in motion perception

Simon Merz

Trier University

Spatial changes of an object over time are usually perceived as motion. Over the years, various perceptual errors have been identified for dynamic, moving objects. These include, but are not limited to, spatial over- or underestimation of the initial or final position (e.g. Fröhlich Effect, Onset-Repulsion Effect, Representational-Momentum Effect, Offset-Repulsion Effect), spatio-temporal discrepancies between moving and stationary objects (Flash-Lag Effect, Flash-Drag Effect) or the interaction between spatial and temporal properties of a dynamic display (e.g. Kappa Effect, Tau Effect). Given the vast amount of different perceptual errors reported over the decades, many theoretical explanations have been proposed. With the common goal of understanding spatio-temporal perception of dynamic objects, the symposium aims to bring together researchers working on the different perceptual biases to enable cross-paradigm perspectives and discussion. The speakers will present experimental work using different experimental procedures, analytical approaches and theoretical background to show current developments in the field, with the final talk in the session allowing general, talk overarching discussions about human spatio-temporal perception and the possible mechanisms underlying these processes.

Presentation type: Oral presentation / Talk

Session: Spatial changes over time: current developments in motion perception

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Computational Approaches to Modeling Cognition

Thorsten Pachur [1], Chris Donkin [2]

[1] Max Planck Institute for Human Development, [2] LMU Munich

Computational modeling provides a powerful tool to study and measure the cognitive underpinnings of behavior. This symposium features recent advances in the application of computational modeling in experimental psychology, showcasing its immense value for learning about cognitive processing across a wide range of applications. Florian Bolenz presents an analysis with the computational framework of metareasoning to model differences between younger and older adults in boundedly rational strategy selection during risky choice. The contribution by Ann-Katrin Hosch features a new evidence-accumulation exemplar model of category learning that allows an examination of how the variance of sampled examplars influences categorization. Chris Donkin presents a project that uses computational modeling to distinguish basic memory processes and strategic response in the DRM paradigm, highlighting the often neglected role of reasoning processes in recognition memory research. Veronika Zilker integrates attentional processes in the computational modeling of decision making with cumulative prospect theory; specifically, she examines whether attentional processes might be key drivers of the description-experience gap in risky choice. In the contribution by David Izydorczyk, a blending model of exemplar-based and rule-based judgment is used to model the cognitive processes underlying quantitative judgment of complex stimuli. Benjamin Kowialiewski presents a connectionist model of visuospatial working memory to study the impact of visuospatial proximity on memory performance. The

symposium will bring together researchers from various research groups in Europe, reflecting the increasing popularity of cognitive modeling in experimental psychology.

Presentation type: Oral presentation / Talk

Session: Computational Approaches to Modeling Cognition

Emotional faces in social cognition: New approaches and recent insights

Michaela Rohr

Saarland University

Emotional faces are one of the most prominent sources for social inferences, and many of these inferences come along automatic (i.e., fast, efficient, unintentional, non-consciously). Research in this field has a long tradition in experimental psychology, and many implicit methods were developed to target the processing of social information from faces. Yet, the research so far focused mostly on the evaluative dimension, static features, and lab experiments. Our symposium brings together latest research approaches studying the influence of emotional faces in social cognition, using new (potentially more ecologically valid) approaches, and spanning some of the most recent debated issues. In detail, Emre Gurbuz' talk focuses on the dynamics of facial features (i.e., emotion, ethnicity) and how these impact evaluative priming effects – a so far often neglected issue. Vanessa Mitschke's research is targeting reactions to others with a very different, yet also dynamic approach: In a series of studies, she found more efficient response inhibition of facial muscle activation towards disliked targets in a go/nogo task. Janet Wessler investigated the influence of facial information in online-negotiations, showing that facial trustworthiness influences anchoring effects. Using a new, endogenous cueing paradigm, Timea Folyi and colleagues highlight that emotional information can be used in a flexible, goal-relevant manner, however, only, if participants intentionally and explicitly make use of the context-bound meaning of the emotional faces. Michaela Rohr's talk focuses on the role of physiological facial information in behavioral measures, suggesting that simulation of activated mental content might drive physiological activity.Emotional faces are one of the most prominent sources for social inferences, and many of these inferences come along automatic (i.e., fast, efficient, unintentional, non-consciously). Research in this field has a long tradition in experimental psychology, and many implicit methods were developed to target the processing of social information from faces. Yet, the research so far focused mostly on the evaluative dimension, static features, and lab experiments. Our symposium brings together latest research approaches studying the influence of emotional faces in social cognition, using new (potentially more ecologically valid) approaches, and spanning some of the most recent debated issues. In detail, Emre Gurbuz' talk focuses on the dynamics of facial features (i.e., emotion, ethnicity) and how these impact evaluative priming effects – a so far often neglected issue. Vanessa Mitschke's research is targeting reactions to others with a very different, yet also dynamic approach: In a series of studies, she found more efficient response inhibition of facial muscle activation

towards disliked targets in a go/nogo task. Janet Wessler investigated the influence of facial information in online-negotiations, showing that facial trustworthiness influences anchoring effects. Using a new, endogenous cueing paradigm, Timea Folyi and colleagues highlight that emotional information can be used in a flexible, goal-relevant manner, however, only, if participants intentionally and explicitly make use of the context-bound meaning of the emotional faces. Michaela Rohr's talk focuses on the role of physiological facial information in behavioral measures, suggesting that simulation of activated mental content might drive physiological activity.

Presentation type: Oral presentation / Talk

Session: Emotional faces in social cognition: New approaches and recent insights

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Recent advances in binding and retrieval in action control I: Learning, task switching, music, and neural correlates

Philip Schmalbrock [1], Silvia Selimi [1], Elena Benini [2]

[1] Trier University, [2] RWTH Aachen, Germany

Humans have to coordinate many different inputs to generate a goal-directed output. Although it seems trivial that we can execute most actions in our everyday life effortlessly - it is not. Several independent processes merge to produce seemingly trivial looking actions. In research on human action control, the processes of binding and retrieval have received increased interest in recent years. In this context, a unified account emerged that strives to specify binding and retrieval in action control (BRAC) over a range of related experimental phenomena and paradigms (Frings et al., 2020). In the first symposium, we take a broad look at research that demonstrates the far reach of action control. The interconnection between learning and action control processes is investigated in two talks regarding performance feedback and associative learning. The following talk is concerned with the role of action control in the auditory domain, specifically in music. The talk after this presents findings on the role of binding and retrieval processes in the context of task switching. The final talk looks at the neural correlates of action control. The contributions presented in both symposia underline the diversity of the research areas investigating human action control and highlight the prominent role of binding and retrieval processes for moving forward in understanding goal-directed human action.

Presentation type: Oral presentation / Talk

Session: Recent advances in binding and retrieval in action control I: Learning, task switching, music, and neural correlates

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Cross-dimensional compatibility effects between quantities, valence and space: Points of convergence and points of divergence

Christian Seegelke [1], Peter Wühr [2]

[1] Department of Psychology, University of Salzburg, Salzburg, Austria, [2] Centre for Cognitive Neuroscience, University of Salzburg, Salzburg, Austria, [3] TU Dortmund University

During the last decades, researchers discovered and investigated a multitude of cross-dimensional S-R compatibility effects between different stimulus and response dimensions, including quantities, valence, and space. A prominent example is the SNARC (spatial-numerical association of response codes) effect, which describes the fact that human participants are faster and more accurate when responding to small numbers with a left rather than right response, and vice versa. Similar compatibility effects occur when physical size (spatial-size association of response code, SSARC) or valence varies as a stimulus feature, and participants respond with spatially distinct responses. Both the etiology and the structural sources of these compatibility effects are a matter of considerable debate. For many cross-dimensional compatibility effects, both local accounts (e.g., the mental number line as an explanation for the SNARC effect) and global accounts, which attempt to explain several phenomena through a general principle (e.g., a theory of magnitude; polarity correspondence) have been proposed. In this symposium, we present new research on different, cross-dimensional compatibility effects. Two contributions deal with the SNARC effect (Miklashevsky, Lindemann, & Fischer; Wühr & Richter), two talks report on the SSARC effect (e.g., Seegelke & Wühr; Wühr, Richter, & Seegelke), and a fifth contribution is concerned with valence-space interactions (Kühne, Nenaschew, & Miklashevsky). Based on these and other results, we evaluate similarities and differences between different compatibility effects, and discuss the plausibility of global accounts for these effects.

Presentation type: Oral presentation / Talk

Session: Cross-dimensional compatibility effects between quantities, valence and space: Points of convergence and points of divergence

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Recent advances in binding and retrieval in action control II: Discarded action plans, event segmentation, and boundaries

Silvia Selimi [1], Philip Schmalbrock [1], Elena Benini [2]

[1] Trier University, [2] RWTH Aachen, Germany

Humans have to coordinate many different inputs to generate a goal-directed output. Although it seems trivial that we can execute most actions in our everyday life effortlessly - it is not. Several independent processes merge to produce seemingly trivial

looking actions. In research on human action control, the processes of binding and retrieval have received increased interest in recent years. In this context, a unified account emerged that strives to specify binding and retrieval in action control (BRAC) over a range of related experimental phenomena and paradigms (Frings et al., 2020). In the second symposium, we take a broad look at research that contrasts the ubiquity and limitations of action control. The first talk looks at the role of binding and retrieval for action plans that are no longer needed. The following talk investigates the role of context and episode discriminability for retrieval processes and connects to the event segmentation literature. It is followed by an investigation on the influence of stimulus modality on the segmentation of action sequences. The last two talks specifically test prevalent assumptions in the action control literature and highlight important boundaries to action control mechanisms. The contributions presented in both symposia underline the diversity of the research areas investigating human action control and highlight the prominent role of binding and retrieval processes for moving forward in understanding goal-directed human action.

Presentation type: Oral presentation / Talk

Session: Recent advances in binding and retrieval in action control II: Discarded action plans, event segmentation, and boundaries

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Source Memory

Nikoletta Symeonidou, Hilal Tanyas

University of Mannheim

Source memory is a cognitive process involved in remembering contextual features of information. This symposium will bring together five researchers who will present recent evidence obtained from various substantive research questions about source memory. First, Tanyas et al. give a talk entitled “Testing the Serial Processing Model of Item and Source Retrieval: Applying the Additive Factor Method to Source Monitoring” and ask whether retrieval processes for an item (e.g., what was said?) and its source (e.g., who said it?) operate serially or in parallel. Focusing on more applied source memory research, Ülker and Bodemer examine external source memory (also with the “who said what” paradigm) and knowledge acquisition in a pseudo-collaborative setting with their talk “Source Memory and Collaborative Learning: The Role of Group Composition and Conflicting Information”. Following this, Symeonidou and Kuhlmann give a presentation namely “Enhanced Source Memory for Emotional Sources: What Is the Role of Encoding Instructions?” where they investigate how encoding instructions influence source-emotionality effects on source memory by using multinomial modeling. The next talk is “Exploring Source Memory to Understand the Mechanisms of JOL Reactivity.” by Loaiza et al. By using a novel implementation of a hierarchical Bayesian model of multidimensional source memory, they query in their registered report, how the act of assessing one’s learning influences later memory. Finally, Niedziałkowska and Nieznański present their work entitled “How Does Cognitive Load Influence Recollection

of True/False Information?" and report findings revealing that cognitive load impairs recollection of false information compared to true information.

Presentation type: Oral presentation / Talk

Session: Source Memory

Advances in TVA-based visual attention research: Basic and Applied

Jan Tünnermann [1], Adriana L. Ruiz-Rizzo [2, 3], Ingrid Scharlau [4]

[1] University of Marburg, [2] General and Experimental Psychology Unit, Department of Psychology, LMU Munich, Munich, Germany, [3] Department of Neurology, Jena University Hospital, Jena, Germany, [4] Paderborn University

Bundesen's Theory of Visual Attention (TVA) has been around for approximately half a century. Its basic idea is that visual perception is biased competition of visual categorizations that race visual short-term memory. The biases stem from attentional and perceptual influences. TVA links observable data to theoretical concepts with mathematical rigor and helps to explain phenomena with quantitatively precise concepts. Progress in TVA might not be fast, but it is continuous and robust. This symposium covers recent developments in topics of basic and applied research. In the first session, Scharlau & Tünnermann survey recent advances with new stimuli and recording settings. Connecting to this, Biermeier & Scharlau investigate attention capacity in mixed-reality settings. Poth & Schneider disentangle the speed of location and object processing. Tünnermann et al. show how simulations of visual foraging depend on dynamically adjusting spatial attention, and Blurton et al. discuss improvements in modeling cognitive control. The second session focuses on recent applications of TVA in clinical contexts: Ruiz-Rizzo et al. present the relationship between visual processing speed and cognitive complaints in older adults. Kattlun et al. investigate the role of visual-short-term memory in cognitive deficits of patients who survived severe sepsis. Martin et al. demonstrate how fatigue relates to visual processing speed and pupillary unrest in post-COVID patients. Srowig et al. close by showing how visual short-term memory is associated with neuropsychological performance in patients at a high-risk for dementia.

Presentation type: Oral presentation / Talk

Session: Advances in TVA-based visual attention research I & II: Basic and Applied

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Topics of Traffic Psychology

Mark Vollrath

TU Braunschweig

The first part of the symposium examines basic cognitive functions in the context of traffic. Working memory is an essential requirement for situation awareness and is examined in an experimental approach with regard to the amount of information and the time passed since perceiving the information. The following two presentations focus on influencing factors for another basic perceptual aspect required for save behavior in traffic, namely time-to-collision estimation. The first of these examines the role of auditory and audiovisual cues while the second works on improving these estimations. The second part shifts to a more applied approach: The fourth presentation examines a neuro-VR approach to examine one of the most accident-prone situations in traffic, driving at intersections. The fifth presentation shifts the focus from cars to bicyclists. In line with current trends to increase the frequency of cycling, an experimental study examines which characteristics of roads are relevant for cyclists and why. The last presentation again shifts the focus to another future part of traffic, namely urban air vehicles and their acceptance. Overall, this symposium demonstrates the width of current traffic psychology research.

Presentation type: Oral presentation / Talk

Session: Topics of Traffic Psychology

Contributions

Voluntary forgetting and perceived truth of news headlines: Can “fake news” simply be forgotten?

Magdalena Abel, Karl-Heinz Bäuml

University of Regensburg

Humans are able to engage in voluntary forgetting of previously encountered information, as for example demonstrated by research on item-method directed forgetting (IMDF). Across a series of experiments, we examined IMDF of news headlines from (presumably) untrustworthy sources, as well as the potential impact of such voluntary forgetting on judgments of truth. The results showed intact IMDF of news headlines in both recall and recognition. Marking headlines as coming from a trustworthy or an untrustworthy source had essentially no effect on memory, but a large effect on perceived truth. In contrast, instructions to remember or forget headlines had a large effect on memory, but only a small effect on perceived truth. Instructions to remember or forget headlines seemed to bias source attributions, which could explain their (small) influence on perceived truth. Taken together, these findings suggest that voluntary forgetting could indeed be helpful for curtailing the spread of false information – at least as long as people are motivated to forget information from untrustworthy sources.

Keywords: Episodic memory, forgetting, voluntary forgetting, directed forgetting, truth effect, illusory truth

Presentation type: Oral presentation / Talk

Session: Forgetting

Measuring Individual Semantic Networks: A Simulation Study

Samuel Aeschbach [1, 2], Rui Mata [2], Dirk Wulff [1]

[1] Max Planck Institute for Human Development, Berlin, Germany, [2] Faculty of Psychology, University of Basel, Switzerland

Semantic representations are the basis of many cognitive functions, including language production, reasoning, or creativity. To account for this fact, cognitive models increasingly draw on large-scale language embeddings derived from text or large-scale databases of semantic behavior. One shortcoming of these approaches is that they

implicitly assume that everyone possesses identical semantic representations, although fundamental theories of human learning and a growing body of empirical work tell us that semantic representations must differ between individuals. Toward overcoming this limitation, this project uses simulation analysis to identify behavioral paradigms best suited to accurately measure individual-level semantic representations. Our simulation creates individual representations by permuting a popular pre-trained language embedding (fastText) and it generates responses in three semantic paradigms–free associations, relatedness judgments, and spatial arrangement—under a variety of different settings (e.g., number of cues). Based on the generated responses, we then simulate how the paradigms recover microscopic (word centrality, word similarity) and macroscopic properties (connectivity, average clustering) of the individual ground-truth representations. Our simulation shows that study designs used in past work can accurately measure some properties of individual-level representations, but not others. Importantly, we find that to measure all aspects of individual level representations reliably, studies that are extremely laborious and costly are needed. We close by discussing implications for future efforts to accurately measure and account for individual-level semantic representations in models of cognition.

Keywords: Semantic Network, Memory, Inference, Network Science, Measuring, Simulation

Presentation type: Oral presentation / Talk

Session: Text comprehension

Malfunctional brain networks in problematic Internet use

Eszter Áfra [1], József Janszky [2, 3], Gábor Perlaki [2, 3, 4], Gergely Orsi [2, 3, 4], Szilvia Anett Nagy [2, 4, 5, 6, 7], Ákos Arató [2], Anna Szente [2], Husamalddin Ali Mohammad Alhour [2], Gréta Kis-Jakab [2], Gergely Darnai [1, 2, 3]

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For the last three decades, Internet has become permanent in our everyday life. However, the limitless avaibility of the Internet and Internet related activities can lead to general Internet dependence. Currently, Internet related missuse has became the fastest growing behavioural addiction. In this study, three addiction forms, problematic Internet use, smartphone addiction and social media addiction were assessed with self-reported questionnaires and to examine functional brain networks, Resting-state magnetic resonance imaging was aquired. Independent component analysis were applied on the discovered Resting-state networks to estimate within network differencies. Significant negative associations were found with problematic smartphone, social media and Internet use in the previously defined Resting-state networks. Our

study suggests that problematic Internet, smartphone and social media use can cause alterations in sensory processing and higher cognitive functioning.

Keywords: problematic internet use, functional magnetic resonance imaging, resting-state, functional brain networks, language network, visual network

Presentation type: Poster Presentation

Session: New media and machine interaction

Resting-state functional connectivity correlates of mental fatigue

Husamalddin Ali Alhour [2], Gergely Darnai [1, 2, 3], Gergely Orsi [2, 3, 4], Gábor Perlaki [2, 3, 4], Eszter Áfra [1], Anna Szente [2], Ákos Arató [2], József Janszky [2, 3]

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Mental fatigue arises during prolonged cognitively-taxing tasks, leading to performance decrements or time-on-task effects (ToT) and declines through rest or incentives. Although mental fatigue is ubiquitously experienced in daily life and its adverse consequences are documented in a variety of settings, its neurocognitive correlates remain uncertain. This study used the prolonged version of the psychomotor vigilance task (PVT) to induce fatigue and resting-state functional MRI (rs-fMRI) to investigate functional connectivity (FC) correlates of the ToT effect and the motivation effect (monetarily rewarding participants after fatigue induction) in 74 young healthy adults. Fatigue scores (change in mean reaction times between the blocks of PVT) were extracted as a measure of overall performance. Fatigue-resistant (n=25) and fatigue-sensitive (n=24) subjects were separated based on fatigue scores. A data-driven, multi-variate pattern analysis (MVPA) was used to derive suitable seeds (4) for later seed-to-voxel analysis -post hoc analysis- to analyse FC patterns. Behaviourally, subjects showed strong ToT drops in performance, as assessed by increasing reaction times as the test progressed. Extra monetary reward positively affected PVT performance in fatigued subjects. Our rs-fMRI results showed changes in FC in task-related brain regions and non-related regions. Specifically, we found TOT-related connectivity changes between the first two seed regions and areas in the frontal, parietal and temporal regions indicative of sensorimotor and cognitive systems, as well as in the insula and anterior cingulate cortex. Increased connectivity between our first seed and the dorsolateral prefrontal cortex was positively correlated with performance improvement due to the reward effect.

Keywords: Mental fatigue, psychomotor vigilance task, motivation, resting-state fMRI, insula, anterior cingulate cortex, dorsolateral prefrontal cortex

Presentation type: Poster Presentation

Session: Health and environment

Auditory distraction in autism spectrum disorder

Lejla Alikadic, Jan Röer

Witten/Herdecke University

Attentional control (AC) allows us to concentrate on relevant information and ignore irrelevant information. The processing of irrelevant auditory information cannot be completely suppressed, however, because of the openness of the auditory system. As a result, auditory distractors have a negative effect on a variety of different cognitive tasks. Auditory distraction in individuals with autism spectrum disorder (ASD) is of particular importance, because of differences in AC compared to neurotypical individuals. However, a systematic, adequately powered investigation has not yet been conducted. The current pre-registered study is designed to close this empirical gap using a classic and robust empirical approach. We will contrast two types of auditory distraction in adult participants on the autistic spectrum with at least medium intellectual and language abilities and neurotypical participants, (1) the disruptive effect of changing distractors compared to repeated distractors (i.e., the changing-state effect), and (2) the disruptive effect of a single distractor that deviates from the previous stimulus pattern (i.e., the auditory deviant effect). The weak central coherence account predicts a more pronounced changing-state effect in individuals with ASD due to superior local low-level information processing, and no differences for the auditory deviant effect. The hypothesis of predictive impairment in autism predicts no differences in the changing-state effect, and a reduced auditory deviant effect due to deficits in the formation of predictions in ASD. The results will contribute to a better understanding of auditory distraction in ASD and its important theoretical and practical implications.

Keywords: Irrelevant Sound Effect, Auditory Distraction, ASD, Autism, Working Memory, Habituation

Presentation type: No-Data Poster

Session:

Investigating the neuronal basis of homing based on path integration

Kevin Allen

Medical Faculty of Heidelberg University and DKFZ

Path integration refers to the ability of an animal to keep track of its position by integrating self-motion cues. Studies in rodents and humans point to an essential role of the hippocampal and parahippocampal areas in this process. These brain areas contain numerous types of spatially selective neurons, including place and grid cells.

How these cells contribute to navigation based on path integration has remained unclear, as these cells are usually not recorded in animals navigating using path integration. I will present a new homing task for mice that we developed to characterize the activity of spatially selective neurons in mice navigating using path integration. I will describe how the activity of hippocampal place cells might contribute to homing based on path integration.

Keywords: path integration, navigation, hippocampus, entorhinal cortex, place cells, grid cells

Presentation type: Oral presentation / Talk

Session: Spatial Navigation

L2 Linguistic Predictions are Limited by Domain General Cognitive Resources: an Eyetracking Study

Christopher Allison, Leigh Fernandez, Thomas Lachmann

Technische Universität Kaiserslautern

We investigated linguistic prediction in second language (L2) English speakers using the Visual World Paradigm (VWP) while using a modified version of the Corsi Block Tapping task to vary cognitive load within participants. Participants completed three blocks of trials with either (1) no, (2) a low, or (3) a high cognitive load manipulation. Each trial began with the presentation of 9 squares in a random grid. Depending on the condition, either 0, (no load) 2, (low) or 4 (high) of the squares would, sequentially, turn gray for 500ms. Participants had to remember the location and order of the squares during the VWP task and recreate the sequence after the VWP task. During the VWP task, participants saw 4 pictures while listening to a sentence and needed to click on the picture mentioned during the sentence. The correct picture was either predictable or unpredictable based on the agent of the sentence. Thus, the experiment followed a 2 (predictable/unpredictable) x 3 (no load, low load, high load) design. Preliminary data (n = 7) support that L2 speakers may have graded predictive abilities based on cognitive resource availability. During the low cognitive load block, predictive eye movements to the target were present but started later than in the no load condition. During the high cognitive load block, there was no evidence of predictive eye movements. These findings provide evidence that the formation of linguistic predictions is both modulated and gated by the availability of nonlinguistic cognitive resources.

Keywords: Linguistic Prediction, Cognitive Load, L2, Eyetracking

Presentation type: Poster Presentation

Session: Language

Memory and meta-information: How meta-information about statements' veracity affects scene memory

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False information influences memories, beliefs, and judgments in a variety of settings (e.g., social media, courtrooms, newspapers) and across a variety of topics (e.g., climate change, vaccinations, crimes). However, classifying information as true or false requires enhanced cognitive resources such as attention and inferential reasoning as the difficulty of distinguishing true from false increases. Therefore, we tested how providing meta-information about the veracity and the discriminability of true and false statements influences participants' memory. First, we assume that memory becomes less accurate as indistinguishability increases. Second, we expect that the discriminability task increases the cognitive load and therefore reduces overall memory performance. The present experiment realized three conditions (between-subject). Participants read one of five scene descriptions consisting of true and false information. In two conditions the distinction between true and false information was affected by means of easily or hardly distinguishable font colors. In the control condition, no visual indication was given concerning the veracity of the statements. An experiment (pre-registered at https://aspredicted.org/blind.php?x=WNG_R6Q) with N = 196 participants was conducted to test participants' memory and confidence in recollecting a series of statements. Initial analyses showed that the presence of meta-information affected participants' memory performance depending on the veracity of the statements. Additionally, overall memory was higher in the control condition. In all conditions, confidence served as a predictor for correct recognition. Understanding the variables that contribute to the process of perceiving meta-information is also important for related research areas, such as the study of misinformation.

Keywords: memory, meta-information, discriminability, cognitive load

Presentation type: Oral presentation / Talk

Session: False information and memory

Brain Activation During Psychomotor Vigilance Test in Problematic Internet Use and Excessive Smartphone Use: an fMRI study

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Introduction: Recent behavioural studies found that the extent of Problematic Internet use (PIU) and excessive smartphone use (ESU) have a long-term impact on chronic mental fatigue, but the effect of PIU and ESU on acute mental fatigue (AMF) is unrevealed until now. Similarly, the underlying neural background of AMF in PIU and ESU is not well understood, therefore the investigation of AMF with functional Magnetic Resonance Imaging (fMRI) is indispensable in these conditions. Methods: Psychomotor Vigilance Task (PVT) was applied to induce AMF during fMRI. Blood-oxygen-level-dependent analysis was implemented to investigate brain activation changes during the PVT. Self-reported questionnaires were used to assess PIU, ESU, and the extent of subjective mental fatigue (SMF). Reaction time changes during PVT were measured to get an objective data of subjects' AMF (OAMF). Results: The extent of PIU and ESU predicts the degree of SMF, but no associations were found between OAMF and questionnaires' score. Changes in brain activation in regions related to default mode network (DMN), attentional processes (the left precuneus and left cuneal cortex) and executive control functions (the left medial frontal gyrus) were associated with the extent of PIU. The degree of ESU showed no correlation with brain activation changes. Discussion: Our findings highlight the impact of PIU on AMF. According to previous results, we confirmed the altered functioning of brain areas connected to DMN in PIU and found some attentional and executive control regions whose activation changes during a cognitively demanding task are related to the extent of PIU.

Keywords: Problematic Internet use, excessive smartphone use, acute mental fatigue, Psychomotor Vigilance Task, blood-oxygen-level-dependent analysis

Presentation type: Poster Presentation

Session: New media and machine interaction

Object-Based Compatibility Effects in a Robotic Telemanipulation Scenario

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Research has indicated that situation awareness plays a crucial role in various areas of human-machine interaction, including for example space exploration, robotic surgery or power plant operation. For most of these areas, telerobotic systems, with which human operators manipulate remote environments by means of controls and displays in their direct vicinity, provide a plethora of advantages (e.g., increased accessibility and technological robustness) and, thus, are on the rise. Tasks completed with telemanipulation systems are often unstandardized, requiring robotic manipulators that can cope with a variety of different and oftentimes unforeseen task demands. Hence, telerobotic systems are equipped with flexible end-effectors that allow manipulation of different types of objects and/or tissues. This also challenges the situation awareness

of human operators, who now need to cope with complex tasks, for which they additionally have to use a telerobotic system that operates in an environment very different from their own. To contribute to the agenda of understanding situation awareness during telemanipulation, the objective of this research was to study object-based compatibility effects as measure of situation awareness. A paradigm was developed, in which a bi-manual telerobot was grasping objects, controlled by the participants left/right key-presses. Object-based compatibility effects were found, that were sensitive to the reachability of an object, as well as to the alignment of the object's handle and the responding robotic end-effector.

Keywords: Object-based compatibility; robot; telemanipulation

Presentation type: Oral presentation / Talk

Session: Spatial Compatibility Effects: Old effects, new ideas and a bright future I

Situation Models During Object Telemanipulation

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Object telemanipulation (i.e., the manipulation of objects at distance by means of input devices and telerobotic systems), is an essential activity for many teleoperation applications such as robotic surgery, space operations or micromanipulation. In order to make full use of the human operators' decision-making capabilities, the input devices and robotic manipulators must be designed to account for various manipulations of objects with diverse attributes such as size, consistency, or surface condition. One possibility to address these demands would be the use of telerobotic systems with multiple manipulators with interchangeable end-effectors. While this modular design increases flexibility of the use of telerobotic manipulation systems in unstructured and complex tasks, it also presents a challenge for operators due to the increasing operation complexity. This is partly described by the 'complexity creep", which describes the effect that increased complexity of technological systems impairs the maintenance of human operator's situation awareness. To contribute to the agenda of understanding situation awareness during telemanipulation, the present research seeks to study the situation models of human operators in a situation in which they control a complex robotic system with various end-effectors.

Keywords: Teleoperation, robot, situation awareness, object manipulation.

Presentation type: Oral presentation / Talk

Session: Experimental Engineering Psychology

The perception of touch during approach-avoidance movements

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Tactile sensitivity on a moving limb is reduced during movement. This phenomenon, known as tactile suppression, is attributed to internal forward models in which predictions of upcoming movement consequences are used to down-regulate actual sensory feedback caused by the movement. Moreover, successful movement control requires the use of incoming sensory feedback. Suppression is therefore modulated by feedback relevancy. An open question is whether the goal, i.e. movement's anticipated future consequences, modulates how predictive and feedback signals are utilized. For example, feedback signals may become more relevant during avoidance than approach behaviors, as erroneous avoidance can be more detrimental than erroneous approach. Here, we examined tactile sensitivity on a moving hand while participants approached or avoided a stimulus. Additionally, we tested whether movement type (arm extension or flexion), previously shown to facilitate behavioral tendencies of approach and avoidance, modulate tactile sensitivity when these goals were reached by both types of movement. Participants flexed and extended their arm towards a positive or away from a negative stimulus in virtual reality (VR). We probed tactile suppression by presenting brief vibrations during movement through the VR-controller. Participants then responded whether they detected this vibration or not. Detection thresholds were significantly larger in all movement conditions compared to when the arm was at rest, indicating tactile suppression. Importantly, detection thresholds were larger in the flexed compared to the extended arm, independent of the movement goal. These results suggest modulation of tactile sensitivity for movements towards the body, independent of the goal to avoid or approach.

Keywords: touch, tactile suppression, approach-avoidance, virtual reality

Presentation type: Oral presentation / Talk

Session: Touch in context: from the body to the external world

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How is multisensory information encoded and maintained in working memory?

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Multisensory integration can occur automatically, in a bottom-up fashion, or require top-down attention. To date, this interaction between attention and cross-modal integration

has been primarily studied on a perceptual level. Yet, it is unclear how multisensory integration and attention interact in working memory and hence, how multisensory information is represented in working memory. Here, using an audio-visual working memory task, participants are presented with one or two temporally and spatially aligned audio-visual memory items. In separate blocks, they are asked to maintain either only auditory or visual features (single-feature conditions) or both features (conjunction condition). After a short delay interval, participants indicate whether the probe item matches any of the task-relevant memory features or objects. As the probe is always audio-visual, it allows us to observe the congruency effects between the two modalities. This allows for conclusions as to whether task-irrelevant features still affect performance. Preliminary behavioral data analysis shows that increasing memory load reduces accuracy and increases reaction times (RTs) across all memory conditions. Further, RTs are slower when both features are maintained than in single-feature conditions. Critically, there is no difference in RTs between congruent and incongruent probes in the two single-features conditions, suggesting that task-irrelevant features are successfully filtered out; conversely, in the conjunction condition, there is a clear probe-congruency effect influencing response times. Ongoing EEG data analysis aims at unravelling at what stage and in what conditions multisensory integration occurs and whether top-down modulations of attention are reflected in the (dis-)engagement of sensory regions.

Keywords: multisensory integration, working memory, attention

Presentation type: Poster Presentation

Session: Memory and working memory

Exploring indirect retrieval of stimulus-response bindings for merely associated stimuli

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When a stimulus is paired with a response, a stimulus response binding (SRB) is formed. Subsequent stimulus repetition retrieves SRB from memory, which facilitates (impedes) performance when the same (different) response is required again. In this study, we explored whether indirect retrieval of SRB by an associated stimulus is possible. Participants first went through a learning task to acquire novel stimulus-stimulus associations. The same stimulus pairs were later presented in a prime-probe task to assess direct and indirect retrieval of SRB. Participants classified word color. Probe words were either identical to prime words (test for direct retrieval), or corresponded to the associated stimulus (test for indirect retrieval), or were unrelated words (baseline). Independently of word relation, response relation (repetition vs. change) across prime and probe trials was manipulated. In a highly powered study (N=130), we only obtained evidence for direct retrieval due to identical word repetition in the probe, whereas evidence for indirect retrieval due presentation of an associated

word was absent. Controlling for participants who did not remember stimulus-stimulus associations did not alter the findings. Hence, our results show that indirect retrieval does not occur at the SRB level as the associated words do not show similar levels of costs/benefits due to response retrieval compared to identical word repetitions.

Keywords: Indirect retrieval, associations, stimulus-response bindings

Presentation type: Oral presentation / Talk

Session: Recent advances in binding and retrieval in action control II: Discarded action plans, event segmentation, and boundaries

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The impact of multisensory stimulation on sensory attenuation

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Research has shown that the processing of the sensory consequences resulting from self-initiated sounds is attenuated as evidenced by the auditory N1 suppression effect. A similar effect has also been demonstrated in the visual domain, but in this case, a self-initiated picture triggered either an attenuated or enlarged N1 response. In the present study, we investigated the processing of self-initiated multisensory audiovisual stimuli. The study comprised three conditions of self-initiated stimuli, namely, self-initiated sounds (auditory), self-initiated Gabor patches (visual), and simultaneously occurring self-initiated sounds and Gabor patches (audiovisual). For each condition, self-initiated sensory consequences and externally-initiated sensory consequences were collected in separate blocks. N1 differences between the self-initiated and externally-initiated blocks were observed for all three conditions. The talk will further discuss the role of sensory N1 suppression across the different modalities.

Keywords: Sensory attenuation, multisensory, EEG, N1

Presentation type: Oral presentation / Talk

Session: Action-perception interaction

How Does the Reaction Time in an Event-Based Prospective Memory Task Change According to the Valence and Arousal Dimensions of Emotion?

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Event-based prospective memory (EB-PM) is defined as remembering to perform a planned action when a specific event occurs, or a specific cue is displayed. Previous studies indicated that EB-PM processes are affected by emotion. In the current study, emotion is considered within the valence and arousal dimensions. Accordingly, the effects of emotional valence and arousal on reaction times in an EB-PM task were investigated. A total of 58 (Female: n=32) university students aged 18 to 30 participated. Pictures used in experimental tasks were selected from IAPS. In the experiment, participants completed the PM task and 1-back visual working memory task simultaneously within the EB-PM task. First, they completed a practice trial of the 1-back visual working memory task. Thereafter, PM targets were presented, and PM instructions were given consecutively. During the 8.5-minute delay between instructions and the EB-PM task, participants completed PANAS and Digit Symbol Task. Finally, participants performed the EB-PM task and recognition test. The experimental design is 3(valence: positive, negative, neutral)x2 (arousal: high, low) within-subjects design. DV was the reaction time in the PM task. ANOVA results indicated that the main effects of valence and arousal were significant ($p<.05$). Reaction times for both positive and negative pictures were significantly longer than neutral ones. Besides, reaction times for pictures at high arousal levels were significantly longer than at low arousal levels. However, the interaction effect of valence and arousal was not significant. It is concluded that both dimensions of emotion caused an increase in the time of PM processing.

Keywords: event-based prospective memory, valence, arousal, emotion, reaction time

Presentation type: Oral presentation / Talk

Session: Emotion

Predicting others' actions from their Social Contexts

Shaheed Azaad, Natalie Sebanz

Central European University

According to predictive process accounts of perception, we identify others' actions by rapidly forming and updating hypotheses about them as they unfold. Recent work has shown that non-kinematic cues, such as others' affordances and intentions, inform our action predictions. We sought to explore whether others' social contexts also guide our predictions for them. Across four experiments, we showed participants videos of an actor walking toward pieces of furniture either with (joint condition) or without (solo condition) a partner standing by the object. Participants indicated the last-seen location of the actor using a touch response, with displacement between joint and solo conditions indicating relative predictive bias toward the end of the actor's trajectory. We found that responses were more predictive for joint videos but not when we instructed participants that actors would perform an action that did not require a partner. Results imply that others' social contexts indeed guide our predictions for them.

Keywords: cognitive science, predictive processing, joint action

Presentation type: Oral presentation / Talk

Session: Perceiving and understanding cues in others' actions

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Imitation following non-functional, non-normative and counter-intuitive action demonstrations

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Heidelberg University

When children see another person modelling an action that is causally irrelevant for achieving a given goal, they quite reliably imitate this action - they overimitate. However, to date, little is known about whether non-functional, non-normative or counter-intuitive action demonstrations elicit imitation in young children to the same extent, and whether age-related changes are similar across different task-settings. Four-to-seven-year-olds (N = 80) took part in three different tasks. Task 1 (jar-task) resembled a typical overimitation experiment – a model demonstrated an action sequence, consisting of functional and non-functional action steps to retrieve a cookie from a jar. In Task 2 (picture task), participants observed the model coloring a picture of natural objects with wrong (unnatural) colors (e.g., blue for an apple), thus demonstrating non-normative behavior. In Task 3 (tower-task), the model expressed the wish to build a high tower from tissue-bags, but placed the bags next to each other, thus building a broad but not a high tower. In contrast to a baseline control condition (N = 28), which did not include any previous demonstration, children in the main study revealed imitation in all three tasks. Results show that the imitation rate was higher when the model demonstrated non-functional actions compared to non-normative or counter-intuitive actions. A positive age effect was found for the jar-task: the imitation of nun-functional actions increased with age. Interestingly, an opposite effect was observed for the other two tasks where younger children revealed more imitation of non-normative and counter-intuitive actions than older ones did.

Keywords: overimitation AND over-imitation, social learning, imitation

Presentation type: Poster Presentation

Session: Moral decisions and social interaction

Spontaneous vicarious perception of another´s visual perspective: influences of stimulus and observer

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Visual perspective taking (VPT) provides people with insights into how objects look from another's point of view. Here, I will review evidence for a recent series of studies that VPT can be understood as a (quasi-)perceptual phenomenon, in which another's perspective "stands in" for own sensory input and drives perceptual decision making. Using a variant of the mental rotation task, these studies show that participants can recognize items oriented away from themselves more rapidly when these items appear in a more canonical orientation to an incidentally presented another person (and slower when oriented even further away from them). These effects are of large effect size and observed even when the other person is completely passive and task-irrelevant. They therefore show that people spontaneously derive the content of another's perspective in a form that can drive perceptual processing like one's sensory input. They are affected by several factors, such as whether participants intentionally take the other's perspective or do so spontaneously, whether the other person attends to the same object as oneself, or whether one is in the presence of another human or an object to which various levels of mental states can be ascribed (e.g., robots, inanimate objects). Together, these findings argue for a framework in which perceptual anticipations of another's perspective underlie social cognition, helping us to understand not only how other's view the world, but also letting us vicariously explore how they would respond to it.

Keywords: perspective taking, visual perspective taking, mental rotation, mental imagery, perceptual simulation

Presentation type: Oral presentation / Talk

Session: Embodiment and perspective taking

Simon Effects based on multiple spatial codes – blast from the past and spotlights into the future

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University of Hildesheim

A longstanding question in the field of spatial compatibility effects recruits to the idea whether multiple spatial compatibility effects are simultaneously possible. These different compatibility effects are indicative of different reference frames used in spatial cognition. Previous studies postulated that simultaneous Simon effects (one particular form of spatial compatibility effects) are in principle formed but only one Simon effect was effectively found, depending on the exact experimental manipulation (Umiltà & Liotti, 1987). Other studies supported this claim further by showing multiple Simon effects when participants were given informative cues or the general spatial layout beforehand (Lamberts et al, 1992; Roswarski & Proctor, 1996). These findings are – to some extent – at odds with recent findings reporting simultaneous Simon effects without any additional information provided (Baess et al, 2022). In the present study, both different version of the Simon task with multiple reference frames (i.e. the one used in Roswarski & Proctor, 1996 and Baess et al, 2022, respectively) were collected for the same group of participants. The talk will report the results of this direct comparison of

the two versions of the Simon task. Further, the role of experimental manipulation such as informative precues and spatial arrangements in general are discussed.

Keywords: spatial cognition, spatial compatibility, reference frames, Simon task

Presentation type: Oral presentation / Talk

Session: Spatial Compatibility Effects: Old effects, new ideas and a bright future I

Both multimedia and interactive features promote the retrieval of information learned using electronic storybooks in primary school children

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Using applications featuring multimedia and interactive elements has increased popularity among teachers. While previous research has shown that multimedia elements efficiently facilitate learning, the results regarding interactive features are contradictory. Since interactive features might serve as distractors (resulting in mixed results), individual differences in executive functions may determine how well children process information accompanied by them. Hence, our aim was to test whether electronic storybooks with multimedia and interactive features improve the recall performance of primary school children. We also measured individual differences in working memory capacity (WMC) and attentional mechanisms. Children (N=73, M=9.5 years) participated in three groups. In the interactive app group, children explored an interactive app featuring a story (both interactive and multimedia elements). In the multimedia-only group, children watched a video with the same story and multimedia elements (but no interactions), while in the control group children heard the same story with static illustrations (no multimedia or interactive elements). After the exposure children answered questions regarding the story. Children also performed tests of sustained attention and WMC. Teachers completed the ADHD Rating-scale IV regarding each child. Our results suggest that children in the interactive app group scored the highest on the questions compared to the other two groups. The results were not affected by individual differences in attentional mechanisms and WMC. In conclusion, compared to the multimedia elements, interactive features elicit physical activities from the user that can lead to better recall performance when using apps with both multimedia and interactive features.

Keywords: attention, educational applications, electronic storybooks, multimedia learning

Presentation type: Oral presentation / Talk

Session: Learning and memory retrieval

First steps towards real-time assessment of attentional weights and capacity according to TVA

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Paderborn University

The collaborative research center “Co-constructing explainability” (TRR 318) deals with creating everyday explanations of decisions made by black-box AI algorithms. Even if an explanation itself was correct and coherent, there may be biases that hamper proper understanding or worse, lead to misconceptions. One way to mitigate this issue is to guide attention. Directing attention in a live interaction between a human and an agent requires repeatedly assessing attention within a reasonable timeframe. Temporal-order judgments in conjunction with Bundesen’s theory of visual attention (TVA) have been a tool to assess visual attention. Current Bayesian approaches estimating attentional parameters happen only after conclusion of the experiment. As a first step to real-time attention assessment, we will evaluate the precision of parameter estimations under typical experimental settings and constraints, which entail gradual data accumulation and varying data quality. Considering expected effect sizes, we will discuss the practical feasibility and utility of the presented approach.

Keywords: TVA, theory of visual attention, modeling, Bayesian parameter estimation, attentional capacity, attentional weight

Presentation type: Poster Presentation

Session: Visual attention

Studying the effects of aesthetic experiences in a real world environment using mobile eye-tracking

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Beauty can be found in every aspect of our lives and is a quintessential part of the human experience. Our study aims to investigate the role that our aesthetic sense plays in our lives. We hypothesize, based on evolutionary theory, that aesthetic experiences are common, influence our perception of the world, have positive impacts on our wellbeing, and can be measured physiologically. In addition, we explore how individual differences and environmental context may influence these effects. Finally, we are also interested in the elicitors of the aesthetic experience, specifically differentiating between man-made (e.g. art) and natural objects. We will employ a multi-method approach where participants equipped with mobile eye-trackers and a heartrate monitor walk along the “Donaukanal” in Vienna, which contains natural elements and street-art. Eye-tracking is used to assess how these aesthetically evaluated objects influence our perception of the world by capturing and directing visual attention. We will look at the effect of aesthetic experiences on wellbeing in terms of positive mood, measured by

Heartrate variability and the I-PANAS-SF (Thompson, 2017). Participants will also be asked to fill out a measure on nature-relatedness (NR-6, Nisbet & Zelenski, 2013) and art interest (VAIAK, Specker et al., 2018) as additional measures of individual differences. In a lab follow-up session, participants will be shown the footage from their walk and asked to rate the beauty of the objects they encountered in the field. This will allow us to investigate the connection between visual attention, wellbeing, and subjective aesthetic rating.

Keywords: Aesthetics, Art, Nature, Wellbeing, Eye-tracking, HRV, Field-study

Presentation type: No-Data Poster

Session:

Thou shall not kill: Cultural similarities and differences in moral judgements

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Moral judgement paradigms allow to investigate cross-cultural differences in moral judgements (e.g., whether to sacrifice one person to save several others). Often, cross-cultural research investigates differences regarding the instrumentality of harm, i.e., whether the death of one person is an instrument to save others (instrumental) or is an incidental side-effect (incidental). Less cross-cultural research exists on differences regarding one's own involvement, i.e., whether one's own life or only other people's life is at risk. The present study investigated the influence of both factors on moral judgements in a Western (Austrian) and an Eastern (Mongolian) culture. Austrians and Mongolians read moral dilemmas. Afterwards, they chose whether (or not) they would carry out an action that sacrifices one but saves several others and rated the moral acceptability of that action. Both cultures chose utilitarian actions (sacrificing one to save others) less often in instrumental than in incidental dilemmas. Thus, instrumental harm is universally regarded as worse than incidental harm. In instrumental dilemmas, Mongolians chose more utilitarian actions than Austrians, indicating that Mongolians more likely act in favor of group welfare. In instrumental dilemmas, Austrians chose more utilitarian actions when their own life was at risk than when only the life of others was at risk. In incidental dilemmas, the opposite was observed for Mongolians. Thus, Austrians more likely act in favor of self-interest, whereas Mongolians perceive harming others to safe oneself as more unvirtuous. Results on moral acceptability ratings and decision times further support those differences. Thus, culture influences certain moral decisions.

Keywords: moral judgement, decision making, cultural differences

Presentation type: Poster Presentation

Session: Moral decisions and social interaction

Modulation of the Shielding-Shifting Balance by Instruction and Reward

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Everyday life confronts us with situations requiring us to flexibly shift between goals or to shield our intentions from distractions to varying degrees. The control dilemma theory posits that individuals adjust their balance between goal shielding and shifting dynamically to meet changing control demands. These different control modes are assumed to afford complementary performance benefits and costs. Despite growing interest in the mechanisms underlying cognitive control regulations, only few studies have directly tested this assumption and recent findings have even called into question the notion of an obligatory shielding-shifting trade-off (Geddert & Egner, 2022). The objectives of our study were to investigate whether such control adjustments are under volitional control, to test the assumption of a shielding-shifting trade-off, and to examine if the task relevance of distracting information moderates control mode adaptations. To this end, we used two task-switching paradigms differing in the informative content of distractors. In a within-subjects design, we instructed participants either to focus their attention on the current task (goal shielding) or to switch flexibly between tasks (goal shifting) to maximize their monetary reward. Participants adjusted their goal shifting according to the given instruction, as indicated by reduced task-switch costs in the shifting condition. However, participants did not succeed in implementing the shielding instruction, i.e., participants' performance was equally impaired by interfering information in both conditions. In line with the control dilemma theory, participants displayed the expected pattern of reciprocal performance benefits and costs. We further found no effect of distractor relevance on control mode adaptations.

Keywords: cognitive control, shielding-shifting dilemma, control dilemmas, meta-control, task switching

Presentation type: Poster Presentation

Session: Cognitive flexibility

Does Pupil-Linked Arousal to Model Reset Require Attention?

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Humans use internal models to make predictions. When the environment changes such that these predictions are suddenly violated, there is model reset, arousal, and potentially learning of a new model. These are accompanied by locus coeruleus activity/norepinephrine release, pupil dilation responses (PDRs), and a neural signal in MEG/EEG equivalent to the MMN. While MMN does not seem to require attention, it is still unclear whether PDRs require attention. To examine this, we generated auditory patterns consisting of regular or random sequences of tones. Regular sequences allow the construction of an internal model. When a regular sequence changes to a random sequence or to another regular sequence, then model reset is induced, as reflected in PDRs. In previous studies, although the sequence structure was task-irrelevant, participants' attention was focused by requiring them to detect a short auditory gap. We examined the consequence of diverting their attention to vision by requiring them to report a change in a fixation cross. Although given auditory attention, PDRs were induced by model reset (as in Zhao et al., 2019, Nature Communications; Basgol et al., 2022, ECVP-conference), they were absent when participants had to perform the visual task. These results suggest that attention might be necessary for PDRs to signal model reset due to environmental changes. Supported by German Research Foundation (DFG): SFB 1233, Robust Vision: Inference Principles and Neural Mechanisms, TP 05, No 276693517, Max Planck Society and Humboldt Foundation (PD), and Machine Learning Cluster of Excellence, EXC 2064/1 No 390727645 (VF).

Keywords: attentional capture, attention, uncertainty, model reset, pupillometry, mismatch negativity

Presentation type: Poster Presentation

Session: Auditory processing

Actions and consequences: participating in cyber-ostracism leads to avoidance of disgusted faces

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Attentional biases are widely researched with avoidance of negative facial expressions being frequently reported. There is, however, still a limited amount of research focusing on attentional biases regarding individuals whom we had an already established connection with. We aimed to find out, how social exclusion or neutral interaction with individuals affects our ability to recognize different emotions on their faces. Participants (N=95) 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 with two pre-programmed players, in three different conditions: (1) Control – the players made the same number of throws to the participant and each other, (2) Bully

– the participant was asked not to throw to one of the players ("excluded"), or (3) Victim – one („hostile") player did not throw to the participant. After this, participants completed the same visual search task, where the faces of the players in the Cyberball game also appeared both as targets and distractors. In the Bully condition the excluded players' disgusted expression was found significantly slower, than disgusted expressions of unknown individuals when the excluded player appeared as a distractor or was not present at all. Similarly, in the Victim condition, the reaction time for finding the neutral players' disgusted expression was the slowest compared to finding the unknown individuals' expression. Our findings support that negative social interactions lead to avoidance of the affected person's negative expressions, as well as that of bystanders'.

Keywords: cyber-ostracism, visual search, social interactions, attention bias

Presentation type: Oral presentation / Talk

Session: Person perception

Interaction behaviour in traffic: Experimental results and challenges for modelling

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The introduction of automated vehicles (Avs) into the traffic system requires that these vehicles are able to communicate with other road users just as human road users do, especially in situations where the road users' trajectories interfere with each other. In such situations the same space is claimed at the same time by at least two road users, in our case two drivers or a human driver and an automated vehicle. Such a situation occurs, for example, when the two vehicles approach a narrow passage from each side and there is no priority regulation. Another such situation occurs when a driver on the right lane of a highway intends to change the lane to the left and there is another vehicle approaching from behind. In a series of empirical studies in the lab and in driving simulators we investigated how humans interact with each other in such situations, which aspects of the driving behaviour are used and perceived as signals of which intentions and with what kind of expectations humans enter such interference situations. Based on these empirical results the next step is integrate these results into (computational) cognitive models of interaction and communication between road users, specifically drivers. Being only at the beginning of this modelling approach we will concentrate on current challenges that need to be addressed for successfully building (computational) cognitive models of such a complex real-world task as driving and even more the interaction of drivers in complex traffic situations.

Keywords: traffic psychology, transportation human factors, interaction, cooperation, cognitive modelling

Presentation type: Oral presentation / Talk

Session: Modeling and experimental validation in real-life environments

Electrophysiological signatures of temporal context in the bisection task

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Time estimation of a given target is affected by the ensemble statistics of the set of intervals that it belongs to. Here we investigated this ensemble context effect using a bisection task in which target intervals were embedded in two types of sample distributions giving rise to low and high ensemble means and measured common EEG signatures of timing, contingent negative variation (CNV), P2 and late negative component of timing (LPCt). The CNV and LPCt components are interpreted to reflect anticipation and decision making mechanism, respectively, whereas P2 component is thought to index temporal accumulation. Therefore, we expected the contextual modulations to have an effect on the activities of both CNV and LPCt, but not on the P2. As predicted, we observed that intermediate durations were overestimated in short compared to long contexts and this bias was related to the CNV and LPCt activities, where the ERP negativities were higher and the offset positivities were lower. Moreover, the LPCt results indicated a linear decrease in amplitude by increasing target durations, suggesting an active decision making process at the stimulus offset for short target intervals. On the other hand, P2 amplitude linearly increased by target durations, while showing no context modulations. In general, the current study results suggest that temporal contexts induce different anticipation and decision making demands for the same stimulus durations and it is possible to study the underlying cognitive mechanism of temporal context by examining the CNV and LPCt amplitudes.

Keywords: EEG, time perception, temporal bisection, CNV, P2, LPCt

Presentation type: Poster Presentation

Session: Cognitive control and conflict

Learning the Prediction of Skilled Behavior

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Our environment is being shaped by other agents, humans live in bigger and denser communities and technology is becoming so autonomous that it can be considered agentic. Thus, it is more important than ever to be able to anticipate the behavior of other agents. Theory of mind is a great framework to explain how an observer thinks about an agent's state of mind. But it rarely takes into account a difference in the skill of the agent and the observer. We propose that learning about an agent's behavior within

a task depends on the agent's and the observer's respective skills. We created an experiment to understand the learning processes involved in predicting an agent's behavior within a skilled task. We built a rule-based agent reasonably skilled at playing a Tetris-like puzzle game. The observers were split into two groups. The experimental group could familiarize themselves with the game; during that time, the control group played a different game, irrelevant to the task. The experiment was conducted on 281 participants over 200 trials. We found that the experimental group could anticipate the agent's behavior above chance from trial one. In contrast, the control group started low and improved over time to the level of the experimental group. We concluded it is necessary to know the task an agent performs to make accurate predictions about their behavior. Thus, mentalizing might not only depend on mentalizing skills but will also be determined by the amount of task knowledge an observer has.

Keywords: Theory of Mind, Expertise, Implicit Learning, Human-Agent-Interaction, Social Cognition, Tetris, Games

Presentation type: Oral presentation / Talk

Session: Human machine interaction and social cognition

The autonomous family vehicle autoELF - Use cases and requirements of parents with minor children

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In the project unicaragil (funded by the German Ministry of Education and Research), the autonomous family-owned vehicle ("autoELF") is being developed for use in a multi-generational family. The vehicle concept is intended to provide a new, more independent means of transport for underage children who have not yet reached the legal minimum age to drive a car and for older people who are no longer able or allowed to drive themselves. We conducted two studies, a qualitative interview study and a usability study, to gain insights into parents' requirements and relevant use cases in everyday life as well as their behaviour when interacting with the vehicle. The focus of the interview study is on the requirements, while in the usability study we use a high-fidelity prototype of autoELF to investigate the behaviour of parents and their underage children when using all the functions required to operate the vehicle. The usability tasks include the trip planning app, safety functions that children should be able to use independently while driving, and the infotainment system. Data collection for the two studies is currently underway. In total, we plan a sample of N = 20 parent interviews and N = 15 teams of parents and children for the usability study. In combination, the studies could promote user-centred development for the next generation of autonomous family-owned vehicles.

Keywords: traffic psychology, mobility, autonomous vehicle, user experience, user requirement

Presentation type: Oral presentation / Talk

Session: Automation while driving – current problems and approaches

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Effects of music on working memory: Metacognitive judgements, distraction, and predictability

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People are well aware of the fact that background sounds disrupt cognitive performance. However, there is one exception: music. Many people think that music they like has positive effects on their cognitive performance. In a series of experiments, we assessed the effect of classical music on verbal working memory. Music consistently disrupted verbal working memory. However, with ongoing exposure to the music, distraction decreased as participants were able to adapt to the disruptive effects of the music. This decrease in disruption was only observed if the music unfolded in the correct order which preserved the coherent structure of the music piece. Retrospective metacognitive judgements indicated that people who liked the music thought their cognitive performance was less disrupted than people who did not like the music. However, cognitive performance was disrupted irrespective of whether the music was liked or not. Even though people may hold the metacognitive belief that music they like will help them to improve their cognitive performance, objective performance measures indicate that music disrupts verbal working-memory processes irrespective of whether they like it or not.

Keywords: auditory distraction,metacognition,judgements of distraction,attention,working memory,metacognitive beliefs

Presentation type: Oral presentation / Talk

Session: Working memory

The attentional impact of an audience on working memory

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Recent studies suggest that the social presence undermines performance in difficult tasks, because the presence of others would automatically capture the attention needed to achieve these tasks. Here, I will present a series of experiments that tested if this

attentional capture (here caused by the experimenter presence) impacts working memory. Several models indeed suggest that maintenance in working memory relies on an attentional mechanism. Besides this mechanism, another non-attentional verbal rehearsal could also maintain verbal information. Our works showed that the effects of social presence were observed only in participants performing a concurrent articulation (a manipulation known to prevent the use of verbal rehearsal). We replicated these results in another experiment in which concurrent articulation was manipulated within participants. Finally, we compared the previous results obtained with the Brown-Peterson paradigm with new results obtained in the complex span task. The Brown-Peterson allow to rely more on long term memory and require less attention that the complex span task. in accordance with our prediction, the effect of presence of the experimenter was larger in the complex span task. Altogether provide the first evidence that social presence hinders attentional, but not non-attentional, maintenance in working memory. They have strong implications for understanding working memory and the impact of social presence, but also important methodological implications. In conclusion, I will argue in favour of a social cognition that relies on precise models issued from cognitive psychology rather than on more general metaphors such as the notion of "resources".

Keywords: Social presence, Working Memory, Attentional Refreshing, Experimenter presence, Social Facilitation and Inhibition

Presentation type: Oral presentation / Talk

Session: Cognitive building blocks in social contexts

The effect of repeated retrieval practice on context-dependent retrieval processes: an EEG study

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The testing effect refers to the phenomenon that retrieval practice, especially repeated retrieval, improves long-term memory retention compared to additional study of the material. In an electrophysiological study, we examined the background mechanisms of the testing effect as a function of practice time by investigating the event-related potential (ERP) correlates of repeated retrieval practice in 6 practice cycles. We additionally investigated the ERP waveforms of the repeated practice phase as a function of retrieval success on the final test 1-week later in a “difference due to memory” (Dm) analysis. We found more positive amplitudes in the later relative to the early phases of retrieval practice for two parietal ERPs: an earlier (500-700 ms) waveform associated with episodic recollection, and a later (700-1000 ms) component related to post-retrieval evaluation processes. We found closely similar Dm effects, suggesting that changes in these waveforms predict retrieval success on the final test. Our results

demonstrate the important role of these retrieval-related processes in the facilitating effect of retrieval practice on long-term memory, and show that the involvement of these processes changes throughout multiple consecutive memory tests.

Keywords: Testing effect, Repeated retrieval practice, Contextual features, Event-related potentials, Difference due to memory effects

Presentation type: Oral presentation / Talk

Session: Benefits of Practice Tests on Learning

A Repeating Task Retrieves the Previous Response in Task Switching

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In the task-switching paradigm, response repetitions (RR) usually yield performance benefits compared to response switches, but only when the task also repeats. When the task switches, RR benefits vanish or even reverse into costs. This interaction between task and response repetition versus switch is called the RR effect. Several theoretical accounts have been proposed for explaining the RR effect. Here, we tested a prediction derived from episodic-retrieval accounts, namely that RR benefits in task repetitions occur because repeating the task retrieves the task-response binding formed in the previous trial. To this end, we considered the probability that participants erroneously repeated the previous-trial response in response-switch trials (i.e., response-retrieval errors). Thus, our tasks employed three response alternatives in order to discriminate between response-retrieval errors and other errors in response-switch trials. Across two task-switching experiments (N= 46 and N=107), results showed that, in response-switch trials, response-retrieval errors were more likely in task repetitions than switches, supporting the notion that the previous response is retrieved by the repeating task, despite being wrong. This finding cannot be easily accommodated by the competing theoretical accounts (e.g., the response-inhibition or the associative-learning account). Thus, the present study indicates task-response binding as an important mechanism behind the RR benefits in task repetitions, since a repeating task seems to retrieve the previous response, which is correct in response repetitions but wrong in response switches.

Keywords: response-repetition effect, binding and retrieval, task switching, response errors

Presentation type: Oral presentation / Talk

Session: Recent advances in binding and retrieval in action control I: Learning, task switching, music, and neural correlates

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Modulation of unconscious priming by merely cued task sets: the role of delayed task set application

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Previous work demonstrated task cues to trigger task set activation. Furthermore, activated task sets were shown to influence masked semantic priming according to the attentional sensitization model of unconscious cognition. In a paradigm combining induction task trials (cued task sets actually had to be performed) and task cue-only trials (task sets were merely cued but not performed), subsequent masked semantic priming in a lexical decision task (LDT) was larger for a semantic compared to a perceptual task set in induction task trials. However, in task cue-only trials the opposite pattern was observed: Priming was larger following perceptual than semantic task sets in task cue-only trials. This indicates that task sets were suppressed, if the cued task had not to be applied (Berger, Kunde, & Kiefer, 2022). In the present work, we studied how the previously observed data pattern is shaped by manipulating the time point of task set application. The paradigm was similar to earlier studies, but the induction task was delayed after the LDT, i.e. the task sets had to remain activated during the LDT to perform a possibly following induction task. Summarizing the results, we observed larger masked semantic priming following a merely cued semantic task set compared to a perceptual one, indicating task sets to remain activated if task set application is not completed. This suggests a crucial role of task demands for determining the time course of task set activation / de-activation.

Keywords: cognition, semantic priming, task cues, task sets

Presentation type: Poster Presentation

Session: Cognitive flexibility

Why does a cyclist prefer certain routes?

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To offer attractive cycling infrastructure in order to promote cycling, it is crucial to examine how attractiveness is defined by cyclists and which route characteristics contribute to an attractive route. In a previous study, we inductively found five criteria that cyclists use to evaluate the quality of routes. The current study aims to examine how route characteristics are evaluated on these five criteria and whether this evaluation reflects the cyclists' preferences towards certain routes.
In a bicycle simulator, N = 39 participants cycled thirteen street segments that varied in the facility type, the volume of motor and pedestrian traffic, the occurrence of traffic lights or intersections, and in gradient. Participants were asked to rate each segment in

total and in terms of the five criteria, and to state the best and worst characteristic of the segment. After the ride, participants were further asked to rank all segments according to their preference.
Results strengthen previous findings on facility evaluations, but further show that sharing the road with many pedestrians is perceived as more attention demanding, but not more stressful than sharing the road with heavy motor traffic. Interestingly, a shared footpath is still preferred over a shared street. Results further indicate that the contribution of the criteria to the total rating varies between the routes. Overall, the findings provide interesting insights into cyclists' route evaluation and demonstrate once again that various characteristics influence each other and form an overall route quality that is more than just the sum of its parts.

Keywords: bicycle simulator study, route preference, cycling facilities, comfort, stress

Presentation type: Oral presentation / Talk

Session: Topics of Traffic Psychology

Mid-level vision in complex scenes

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Human observers can rapidly perceive complex real-world scenes. Grouping visual elements into meaningful units is an integral part of this process. We here introduce a new, image-computable approach for detecting mid-level features in complex, real-world scenes. Specifically, here we manipulated the local parallelism content of real-world scenes. We decoded scene categories from patterns of brain activity obtained via functional magnetic resonance imaging (fMRI) in 38 human observers while they viewed the manipulated scenes. Decoding was significantly more accurate for scenes containing strong local parallelism compared to weak local parallelism in the parahippocampal place area (PPA), indicating a central role of parallelism in scene perception. To investigate the origin of the parallelism signal we performed a model-based fMRI analysis of the public BOLD5000 dataset, looking for voxels whose activation time course matches that of the locally parallel content of the 4916 photographs viewed by the participants in the experiment. We found a strong relationship with average local symmetry in visual areas V1-4, PPA, and retrosplenial cortex (RSC). Notably, the parallelism-related signal peaked first in V4, suggesting V4 as the site for extracting parallelism from the visual input. We conclude that local parallelism is a perceptual grouping cue that influences neuronal activity throughout the visual hierarchy, presumably starting at V4. Parallelism plays a key role in the representation of scene categories in PPA. Our suite of computational tools is publicly available as a software toolbox for the analysis of real-world images.

Keywords: perceptual grouping, scene perception, parallelism, mid-level vision

Presentation type: Oral presentation / Talk

Session: Advances in data analysis

Detecting a discriminatory response: Integration and retrieval in odd-one-out detection tasks in visual search

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University of Trier

In odd-one-out tasks in visual search, participants signal the detection of a target popping-out among distractors. Here, benefits for the popping-out dimension, like color or orientation arise, thought to be caused by dimension weighting. Responses in such tasks are done by pressing a certain key for present targets, whereas the absence of a target is signaled with another key. Yet, only trials with succeeding present targets are analyzed, whereas all other are typically excluded from analysis (as no target with feature dimension is present). According to action control theories, responding to stimuli leads to binding of response and stimulus' features into an event file and upon repetition of any of its component to its retrieval. Accordingly, responses to the presence and absence of stimuli in visual search detection tasks can be seen as discriminatory responding that can repeat or change. We hypothesized that (often-ignored) absent trials should still affect task performance in accordance with binding mechanisms. In the present study, participants signaled the presence or absence of a target popping-out among distractors. Targets stood out either by shape or orientation dimension. Importantly, from one display to the next, all presented stimuli could repeat or change their color. We observed dimension weighting in present-present trials. Crucially, we also observed a strong binding effect between present/absent responses and color across all trials. Our results suggest that binding effects are ubiquitous in experimental designs not intended to investigate such. Further, our results offer new perspectives for visual search by incorporating action control theories.

Keywords: visual search, action control, stimulus-response binding, detection

Presentation type: Poster Presentation

Session: Visual attention

Are there different representations in different phases of an action?

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Several theories of visual perception and visually-guided action make varying assumptions about the nature of the underlying cognitive representations. Often, the

representations used in the early phase of action planning are assumed to be more abstract/amodal, while in the later control phase, they are assumed to be more concrete/modal. We will test these assumptions by using interference from a secondary task performed in parallel to a grasping task. The secondary task will be a memory test with either modal or amodal content which should interfere with grasping when the corresponding representations are of similar format. For example, an amodal secondary task might increase early parameters of a grasping movement, such as early grip aperture variance (EGAV) and reaction time (RT). In contrast, a modal secondary task might interfere with late parameters like maximum grip aperture variance (MGAV) and movement time (MT). Participants will be shown four stimuli at four different locations to memorize, then grasp an object, and then reproduce one of the four memorized stimuli. In the modal condition, memorized stimuli will be lines of different lengths. In the amodal condition, memorized stimuli will be numbers representing different line lengths. We expect larger EGAV and RT in the modal condition and larger MGAV and MT in the amodal condition. The outcome will be useful in determining whether the nature of representations changes during the course of an action.

Keywords: Action, perception, grasping, representations, modal, amodal

Presentation type: No-Data Poster

Session:

Modeling Safety Risks at Intersections for Drivers with Limited Visual Perception

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Intersections have shown to produce many traffic accidents. The limited visual abilities of drivers with a visual field defect expose them to a particularly high risk for safety-critical errors. One characteristic scenario is the overlooking of oncoming traffic participants from the affected side. The description and prediction of crash risks allows the development of countermeasures like trainings or driver assistant devices. Since these analyses are mainly based on naturalistic driving studies, the anticipation of crash causes is aggravated for drivers with limited vision due to their reduced driving exposure. This talk presents an approach to identifying increased safety-risks for current non drivers: the agglomeration of crash analyses for normal sighted drivers with the integration of theories on human perception, the consideration of results from driving simulator studies observing drivers with a visual field defect and the application to

relevant use cases. The resulting structural causal model allows the derivation of crash causes that pose an increased risk of occurring among drivers with limited vision.

Keywords: modeling; crash causes; limited perception

Presentation type: Oral presentation / Talk

Session: Modeling and experimental validation in real-life environments

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Social norms for social housing: A communication experiment for adoption of energy efficient technology in social housing

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[1] University of Seeburg, [2] University of Konstanz

Social norms are considered a very robust behavior change approach and are well-established in promoting pro-environmental energy behaviors, particularly in contexts where citizens are insecure about their options (Farrow et al., 2017). One such context is the one of social housing, where a lack of trust and perceived risk are large barriers to adoption of energy efficiency measures (McCabe et al., 2018). For tenants in social housings, energy efficiency technologies offer the potential to improve monetary savings and comfort, while having wider environmental impact than individual household installations (Brown et al., 2014; McCabe et al., 2018). We investigated whether descriptive social norms would increase uptake of an efficiency retrofit device for heating in social housing. We used two randomized controlled trials with communication to tenants occurring in letters from their housing administrators, one control group with the standard letter, and one experimental group with an added social norm describing how many other tenants had already installed the technology. Logistic regressions predicted the effect of social norm on adoption. In the first study, a significant higher uptake was found (ß = 1.7, p = .024), though randomization occurred only at apartment block level. In the second study, where letters were randomized at apartment level, we found a significant main effect (ß = 1.62, p = .02), when taking into account a significant interaction between social norms and one of the housing blocks (ß = -2.2, p = .034).

Keywords: technology acceptance, social housing, social norms, field study

Presentation type: Oral presentation / Talk

Session: Social cognition

Social Environment and Information Structure Effects

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The social ecosystem shapes information flows among social agents determining which agent has access to which information. The ecology of such an ecosystem has more far-reaching consequences than we thought, as social agents adapt to and leverage the information ecology. Here, we aim at unveiling the dynamics that the information ecology and agents' adaptations jointly pose on social perception. In our paradigm, participants are presented with a sampling task involving two social perception targets. Their goal is to explore the social environment and find cooperative peers. After each interaction, participants receive information in terms of the target's social behavior (cooperating in a trustworthy manner or behaving selfishly refusing to cooperate). Unlike typical sampling and canonical impression formation tasks, the information ecology is manipulated by introducing a mutual social connection between the participant and one of the two targets. Such a connection is asymmetrically feeding information to the participants, making one of the two targets incidental (information is provided regardless of the sampling decision) and the other one selective (can only be sampled directly). In the epistemic condition, participants leverage the ecology to fully explore the social environment, while in the hedonic condition, participants are more likely to truncate their exploration as negative information is obtained. Therefore, the information ecology is leveraged differently based on the goal at hand, and the consequent dynamics bias the information samples in different ways. From biased samples, only biased inferences (i.e., impressions) can be drawn.

Keywords: information sampling, impression formation, social interaction, social environment, decision-making, judgment

Presentation type: Oral presentation / Talk

Session: How agents' cognitive processes shape self-determined information search and the resulting judgements and decisions

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Comparison of attention capacity across mixed realities

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Paderborn University

Without visual attention, we would be quickly overwhelmed by the mass of information surrounding us. Consequently, understanding attention matters not only to cognitive psychology but for example also to human-computer interaction research. Especially in mixed reality research, it is of broad interest to understand and therefore to be able to guide (visual) attention in complex environments. The basis to understand attention is a quantification of it. We have chosen a combination of a temporal order judgment task (for its ease of integration in many tasks) combined with a suitable TVA model to estimate attention capacity (TVA's C) in Virtual Reality (VR), Augmented Reality (AR), and Reality (R) in a withing subject design. We compare the estimated C's to decide whether First: the degree of virtuality has an influence on attention or Second: the

different kinds of mixed reality have different effects on visual attention. At the end of the talk, we want to discuss challenges to measuring visual attention in mixed reality and how cognitive psychology and human-computer interaction can jointly benefit from interdisciplinary research on this topic.

Keywords: TVA, Mixed Reality, Visual Attention

Presentation type: Oral presentation / Talk

Session: Advances in TVA-based visual attention research I: Basic and Applied

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Choices between labor and leisure in lab and life

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In life, people often make choices between *cognitive labor* (high-demand tasks that produce external rewards) and *cognitive leisure* (low-demand tasks that provide relief from labor, but do not produce external rewards). For example, this happens when an employee decides between working on their spreadsheet vs. chatting with their colleague. In this talk, we examine how people make labor–leisure decisions. In particular, we focus on the role of mental fatigue, testing predictions derived from the opportunity cost model (Kurzban et al., 2013, Behavioural and Brain Sciences). In four lab studies, participants freely chose between labor (2-back task, paid) and leisure (e.g., playing with their smartphone). We consistently found that mental fatigue biased people's choices towards leisure. Also, in line with the opportunity cost model, we found that the attractiveness of available leisure options was linked to mental fatigue—i.e., when people felt their leisure options were more attractive, they got fatigued more quickly during labor. Next, in two field studies, we examined the link between fatigue and naturally-occuring choices (specifically: how often people pick up their smartphone during work; how often people sit down and stand up during work). In sum, based on our research, we propose that the opportunity cost model is a promising tool for modeling free choices between labor and leisure in lab and life.

Keywords: cognitive fatigue, mental effort, cognitive effort, value-based decision making, sedentary behavior, exploration

Presentation type: Oral presentation / Talk

Session: Current directions in free-choice paradigms II: What we can learn from giving more control to the participant

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Taking the level 1 visual perspective of a robot avatar requires conscious processing

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One implicit assumption underlying the use of digital avatars is that human-avatar-interaction mimics human-human-interaction, especially when similarity between human and avatar is high. Using a level 1 visual perspective taking (L1 VPT) task (Samson et al., 2010) in an online experiment (*N* = 102), we tested the hypothesis that perceived similarity in terms of anthropomorphism strengthens L1 VPT, causing higher altercentric and egocentric intrusions for human avatars as compared to robots. Intrusions were measured through reaction times and error rates. The design was manipulated within subjects: 3 (avatar: human, humanoid, roboter) x 2 (human's and avatar's perspective: consistent vs. inconsistent) x 2 (task: apply the avatar perspective vs. self-perspective). Against the prediction, we found comparable degrees of intrusions for human, humanoid, and robot avatars. However, while for human avatars intrusions were unrelated to the applied perspective, for robot avatars, intrusions increased under the avatar perspective as compared to the self-perspective. We suggest that for robot avatars, calculating responses is not an automatic process, but rather only takes place after the controlled, conscious process of selecting the relevant perspective. Also, the role of attentional cues like gaze direction will be discussed.

Keywords: Level 1 perspective taking, avatars, robots, humanoid, self-other-distinction, similarity

Presentation type: Poster Presentation

Session: New media and machine interaction

Evaluating the perception of phase transitions in high frequency flicker

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Alternating two different visual stimuli induces the perception of flicker. Such stimulation is often used to induce steady state visually evoked potentials in the Neurosciences. If the stimuli are alternated at a higher frequency above their flicker-fusion threshold they are perceived as non-flickering. For example, alternating black and white at a high frequency is perceived gray. Nevertheless, a transition between phases is still perceived (e.g., when switching from sequential presentation of black-white to white-black, the white stimulus is presented twice in direct succession; which creates a noticeable percept). If it were possible to reduce the perceptibility of such phase transitions, we could improve and generalize the stimulation sequences used for steady state visually evoked potentials. In a study with n=24 participants, we will focus on reducing perceptibility of such phase transitions. We will investigate different types of phase transitions in black-white flicker stimuli: (a) gradients between extrema, which uses

gradual shifting between black and white for reducing the contrast and embedding a transition at the perceived mid gray level, (b) (high- and bandpass) filtered direct transitions, and (c) flipping pixels in which individual pixels are changed from one phase to the other (e.g., from white to black). We will compare sensitivity of participants to transitions created by those techniques using two-alternative forced choice tasks and thereby identify techniques that are best suited to render phase transitions almost imperceptible.

Keywords: flicker-fusion threshold, phase transition, flicker perception, attention

Presentation type: No-Data Poster

Session:

Using TVA to model cognitive control

Steven Blurton, Anders Petersen, Signe Vangkilde

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We have recently developed an extension to TVA that makes the theory applicable to response times (RT) based tasks. In this talk, we present results from applying a TVA-based RT model to data obtained in a Simon task. The Simon task is a simple perceptual decision task that requires cognitive control to supress task-irrelevant location information and solve response conflicts. We review some of the various models and theoretical accounts which have been proposed to explain performance in the Simon task, and present a new, TVA-based response time model designed to explain RT distributions, delta curves, and sequence effects. This model can explain the typical negative going delta curves with the assumption of a mixture of TVA parameters, an assumption we derived from the Executive Control Theory of Visual Attention (ecTVA, Logan & Gordon, 2001, Psychological Review). For all model evaluations, we present newly collected data from an extended version of the Simon task. The increased number of trials in the task improved the estimates of RT distribution and also allowed us to analyse learning effects during this task. Our results support the notion that learning decreases the typical RT effects in a Simon task. All results are discussed from a model-based perspective in terms of the TVA-based model. We conclude by considering the scopes and limitations of our approach and applications to other experimental paradigms typically used to assess cognitive control.

Keywords: Cognitive control, visual attention, response time modeling

Presentation type: Oral presentation / Talk

Session: Advances in TVA-based visual attention research I: Basic and Applied

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Assimilative and contrastive reactions to other persons' fortunes and misfortunes: A social comparison framework

Lea Boecker

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When confronted with others' fortunes and misfortunes, emotional reactions can take various courses—ranging from assimilative (happy-for-ness, sympathy) to contrastive reactions (envy, schadenfreude) and from prosocial (reward) to antisocial behavior (punish). We tested how social comparisons shape these reactions and integrated findings into a social comparison framework using a novel paradigm. In nine experiments participants played variants of a lottery in which they could win (= fortune) or lose (= misfortune) different amounts of money. We presented participants with lottery outcomes of others who either ranked lower than (i.e., downward comparison), similarly to (i.e., lateral comparison), or higher than (i.e., upward comparison) on the comparison dimension (start money or cognitive abilities) prior to their (mis)fortunes. I present an overview of the nine experiments in which (1) participants' ranking on a comparison dimension relative to other persons and (2) others' dynamic (mis)fortunes (changing their relative ranking) determined how much individuals experienced envy, happy-for-ness, schadenfreude, and sympathy. Emotional reactions also evoked behavioral consequences: The contrastive emotions envy and schadenfreude decreased prosocial behavior, while the assimilative emotions happy-for-ness and sympathy increased prosocial behavior. Overall, the data suggest that envy and sympathy arise when comparative concerns are threatened, and happy-for-ness and schadenfreude arise when they are satisfied (because inequality increases vs. decreases, respectively) and explain behavior aimed at dealing with these concerns. In addition, I will present new data in which we investigate whether the four emotions differ when social comparisons are elicited in gain versus loss contexts.

Keywords: social emotions, social comparisons, envy, schadenfreude, prosocial behavior, inequality

Presentation type: Oral presentation / Talk

Session: The relative self: Social comparison and its implications for cognition, well-being and self-construal

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The influence of effort instructions on producing head fakes in basketball

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Performing incompatible movements at the same time induces response-response incompatibility costs. Such costs also occur in sports settings, for example, when

passing the ball in one direction while orienting the head in the opposite direction (i.e., head fake). In Basketball, performing passes with head fakes results in higher initiation times and error rates compared to passes without head fakes (so-called head fake production costs) when participants had no or only little time to mentally prepare the movement (Güldenpenning et al., 2022). This study addresses the question whether the production costs of head fakes can be reduced when using effort instructions (asking participants to try harder in the following trial). These effort instructions could allocate some cognitive capacity to the task, which are otherwise used for monitoring processes (e.g., observing the environment; Kahnemann, 1973). This should reduce the initiation time of the participants following effort instructions. In this study participants (N = 20, Mage = 22.3 years) were asked to perform passes with or without head fakes. In 20% of all trials, they received effort instructions ("Anstrengen") and in the remaining 80% of trials, a standard instruction ("Standard") was presented. The results show that the use of effort instructions generally reduces the initiation time compared to standard instructions (435 ms vs. 448 ms, $F(1,19) = 14.33$; $p = .001$; $\eta p2 = .43$), regardless of the type of pass. The effectiveness of the effort instructions was therefore not modulated by the difficulty of the chosen task (pass with or without head fake).

Keywords: perception, action preparation, movement planning, effort instructions

Presentation type: Oral presentation / Talk

Session: Perception and Action in Sports

Avatars that pop! Investigating the role of attention for avatar-based compatibility effects

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In virtual environments, we often interact with avatars that may provide spatial reference frames. Previous studies have shown that such reference frames change the spatial encoding of objects. For example, the same object may be seen as left or right relative to an avatar and this spatial code may change based on the avatar's perspective. The position of objects from the avatar's perspective can lead to spatial compatibility effects, indicating that objects are spontaneously coded relative the avatar's perspective rather than from a person's own point of view. The present study investigated the role of attention for these avatar-based compatibility effects. Participants were asked to respond to the color of vertically presented stimuli in a Simon task. The stimuli were presented next to an avatar that provided a reference frame to code the position of the stimuli as either left or right. In half of trials, the avatar flashed red at the time of stimulus presentation to draw the participants' attention to it (pop condition). In the other half, the avatar remained unchanged (control condition). The results showed a Simon effect from the avatar's perspective in both conditions. Importantly, this Simon effect was significantly larger in the pop condition, indicating that attentional shifts towards the avatar increased the impact of the reference frame provided by the avatar.

Keywords: avatars, stimulus-response compatibility, Simon effect, reference frames, attention, perspective taking, reaction times

Presentation type: Oral presentation / Talk

Session: Spatial Compatibility Effects: Old effects, new ideas and a bright future II

The attention bias to cleanliness stimuli in a disgust mood: The right task helps to replicate it

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[1] Ege University, [2] Saarland University

The primary aim of our study was to examine the moderation of an attentional bias (AB) to cleanliness-related stimuli by mood state (i.e., AB appears in disgust mood but not in neutral mood) as found by Vogt et al. (2011) with the dot-probe task and whether this moderation is driven by motivational processes or affective counter-regulation. Therefore, we added a positive stimulus category to the design: If affective counter-regulation is the decisive mechanism, the moderation of AB by mood should generalize to positive stimuli. If it is a motivational process (as suggested by the authors) the moderation should be specific for cleanliness-related stimuli. In Experiment 1, we used – as Vogt et al. – a localization dot-probe task ("Is the target left or right?") after inducing either a disgust or a neutral mood (Ndis=110, Nneu=108, online). We did not replicate the moderation effect of mood on the AB to cleanliness stimuli. We run Experiment 2 to examine whether this unexpected result might be dependent on the task since it can be argued that the localization task confounds attentional processes with response priming processes. Therefore, we used a discrimination dot-probe task ("Is the target a p or q?") to avoid this confound (Ndis=105, Nneu=105, online). Now, we replicated the moderation effect of mood on the AB to cleanliness stimuli. (The effect, however, was smaller than the original one.) The result is more compatible to the motivational account than to counter-regulation since the AB for positive stimuli was not moderated by mood.

Keywords: attention bias, disgust, motivation, counter-regulation, dot-probe

Presentation type: Oral presentation / Talk

Session: Emotion

An investigation of odor associated autobiographical memory

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Typically, odor associated autobiographical memories tend to be rarer, older, more vivid and more emotional than AMs associated with other stimuli. Even though this set of findings has been replicated the mechanism behind mechanism behind the findings is still unclear. One possible explanation is that the typical emotional processing of odors conflates with the experience of the memory itself, making the memory seem more emotional than it would have been if not retrieved in the presence of an odor. To test this hypothesis, we conducted three studies in which participants retrieved their memories in response to odors and other stimuli in one session and rated the respective memories in another session without the stimuli present. The results of the three studies will be compared to previous studies on this topic and possible mechanisms underlying differences between odor and other elicited AMs will be discussed.

Keywords: Autobiographical Memory, Odors, Olfaction, Proust Phenomenon

Presentation type: Oral presentation / Talk

Session: Learning and memory retrieval

Investigating Age Differences in Risky Choice through the Lens of a Rational Strategy Selection Model

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How people make decisions under risk changes across the adult lifespan. Here, we investigate to what extent age differences in risky choice can be understood as reflecting differences in the rational selection of different decision strategies. For this purpose, we use a rational strategy-selection model that assumes that decision makers select decision strategies by optimizing the trade-off between a strategy's payoff and the cost of implementing this strategy. Analyzing risky choice data from 60 younger and 62 older adults, we find that the rational strategy-selection model is able to capture age differences with respect to decision quality and risk preference. According to the model, younger and older adults differ in their strategy use. However older adults do not use simpler strategies or weight strategy cost more strongly during strategy selection. Instead, older adults seem to rely more frequently on strategies that focus more strongly on information about outcomes than on information about probabilities for making a choice. Our results suggest that age differences in risky choice might not primarily be driven by cognitive factors but instead reflect experience-based or motivational differences in strategy use. More generally, our study highlights the usefulness of a strategy-selection perspective for understanding age-related differences in decision making and points to an alternative to more commonly used psychoeconomic modeling frameworks.

Keywords: aging, cognitive modeling, decision making, risk

Presentation type: Oral presentation / Talk

Session: Computational Approaches to Modeling Cognition

Control at our fingertips? Co-Acting with Avatar Hands and the Role of Intentionality during Virtual Joint Action

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The occurrence of the joint Simon-Effect (JSE) can be regarded as an indirect measurement of self-other integration in dyadic interactions. Current JSE research hints towards a prominent role of the co-actor's agency and/or intentionality without fully differentiate between bottom-up and top-down manipulations. To separate bottom-up and top-down modulation effects, we conducted a series of three browser-based Joint Simon experiments (N ≈ 300). Firstly, we established a new digital scenario to reliable evoke a JSE. A virtual human hand was presented on the right side controlled by the participant. By performing a go/nogo-task with (joint) or without (individual) a second computer-controlled hand on the left side of the display, we showed a reliable JSE based on reaction times, and we varied the appearance of the virtual co-actor's hand between subjects, showing a stronger JSE for a human compared to a robot co-actor (E1). Additionally, the perceived agency of the co-acting hand was manipulated solely using visual information (bottom-up) by comparing a moving and a non-moving co-actor in the second experiment. We found no effect for the agency-manipulation, but a persistent bottom-up-effect of the co-actor's hand (human vs. robot) indicating a prominent role of bottom-up-information regarding a virtual co-actor's intentionality. In Experiment 3, we showed an increased JSE for an intentional described (top-down) virtual robot as compared to a non-intentional virtual robot. Conclusively, this series suggests a model in which bottom-up and top-down information need to be integrated to fully understand the role of intentionality in joint action.

Keywords: joint Simon effect, stimulus-response compatibility, agency, intentionality, virtual co-actor

Presentation type: Oral presentation / Talk

Session: Spatial Compatibility Effects: Old effects, new ideas and a bright future II

Are you sure? Modeling metacognition in the wild

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Metacognition – one's evaluation of their own cognitive processes – plays major role in our behavior. The past decade has seen an explosion of interest in measuring and modeling metacognition, shedding light on some of the key manifestations of metacognition such as confidence judgements, error monitoring, and changes of mind.

However, the studies of metacognition have so far been mostly limited to simplistic paradigms like perceptual discrimination based on abstract stimuli or hypothetical preferential choice between food items. At the same time, metacognition in dynamic, situated decisions that are pervasive in our daily life has received little attention in the literature. As a first step to address this gap, here we investigated human drivers' confidence in left-turn decisions in a driving simulator experiment. We found that drivers' confidence in their decision changes with the task parameters in a way that is consistent with key findings on metacognition in simple perceptual decision making. We compared the observed data to predictions of a previously proposed evidence accumulation model of left-turn decision making that was extended to provide a proxy measure of confidence. Our results suggest that metacognitive mechanisms implied in simple tasks can be traced also in more dynamic, real-life behaviors such as driving.

Keywords: Metacognition, Confidence, Decision making, Driver behavior, Evidence accumulation

Presentation type: Oral presentation / Talk

Session: Modeling and experimental validation in real-life environments

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Internal Verbalization and its Effect on Object Recognition and Abstract Categorization

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Studies have shown that individual differences in inner speech propensity may impact how fast participants recognize objects. In addition, inner speech has been suggested to support abstract thinking and metacognition. In the first part of this study, we provide a means to assess individual differences in inner speech in German-speaking samples by validating a German version of the Internal Representations Questionnaire (IRQ), an instrument measuring different modes of thinking, including the tendency to experience inner speech, termed Internal Verbalization (IV). Results from validity and reliability analyses will be discussed in view of the original IRQ. Then, we examine the effects of IV in a word-picture verification task where participants match words followed by pictures and vice-versa, with cue-target similarity varying continuously in phonological and semantic dimensions. Following previous reports of a role for inner speech in object recognition, we predict slower responses in phonologically similar trials and faster responses in semantically similar trials for individuals with higher IV. Furthermore, we examine the effects of IV in a task where participants select images in contexts with varying degrees of abstract thinking demands and then indicate how confident they are in their selection. Following studies associating linguistic abilities with abstract thought and metacognition, we predict for higher IV shorter times to select a picture in abstract trials and to indicate response confidence. The results will help assess the predictive validity of the German IRQ and will be discussed in light of previous evidence connecting inner speech and cognition.

Keywords: inner speech, individual differences, object recognition, abstract thought, metacognition, word-picture verification

Presentation type: Oral presentation / Talk

Session: Tell me and talk to me – the influence of language on goal-directed performance

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TRACK - a new algorithm for the analysis of pursuit-tracking sensorimotor integration processes

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In daily life, sensorimotor integration processes are fundamental for many cognitive operations. The pursuit tracking paradigm is an ecological and valid paradigm to examine sensorimotor integration processes in more complex environments/tasks. However, the analysis of pursuit tracking performance is complicated, and parameters quantified to examine performance are sometimes ambiguous regarding their interpretation. We introduce a new open-source algorithm (TRACK) to calculate a new tracking error metric, the spatial error, based on the identification of the intended target position for the respective cursor position. The identification is based on assigning cursor and target direction changes to each other as key events, based on the assumptions of similarity and proximity. By applying our algorithm to pursuit-tracking data, we show that the spatial error replicates known effects such as learning or practice effects. Beyond replication of established findings, we show that the spatial tracking error fits our behavioral data better than the temporal tracking error and provides new insights and parameters for the investigation of pursuit-tracking behavior. Our work provides an important step towards fully utilizing the potential of pursuit tracking tasks for research on sensorimotor integration processes.

Keywords: sensorimotor integration, tracking task, algorithm

Presentation type: Poster Presentation

Session: Motor and action control

The influence of action complexity on anticipatory saccades

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When our actions are followed by predictable consequences, we anticipatorily move our eyes towards the location at which the expected effects of our actions will appear in the future. Such anticipatory saccades demonstrate a proactive effect monitoring process that supports a subsequent comparison of the actual and the expected effect. Importantly, the timing of such anticipatory saccades correlates with the timing of effect-generating (e.g., manual) actions. We hypothesized that this is the case, because the processes of action selection and proactive effect monitoring rely on the same cognitive resource. Thus, here we manipulated action complexity (1 choice vs. 2 choice left/right manual actions vs. corresponding steering wheel turns) while keeping target-effect intervals constant and varying the time of the manual response (immediate vs. delayed: wait for go signal). Anticipatory saccade latencies, like manual reaction times, were longer in the delayed condition and increased with action complexity. Furthermore, anticipatory saccades preceded delayed manual responses for all action complexity levels. Moreover, the frequency of anticipatory saccades decreased with increasing action complexity. The observed pattern of results supports the idea that action selection and proactive effect monitoring rely on the same cognitive resource.

Keywords: action control, action-effect learning, anticipatory saccades, monitoring, action complexity

Presentation type: Poster Presentation

Session: Motor and action control

Show Some Emotion: Processing Of Feedback In Easy And Complex Learning Tasks – An ERP study

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Learning from the emotional reaction of others is a crucial component in our everyday lives and monitoring one´s performance by observing emotions may be of particular relevance when task complexity is high. The aim of the present study was to investigate whether participants benefit from emotional feedback and to explore the underlying neural mechanisms by examining two event-related potentials (ERPs) - the feedback-related negativity (FRN) and P3b. Participants completed a probabilistic learning task while their electroencephalogram was recorded. Task difficulty was manipulated by varying the complexity of stimulus-response associations. Specifically, participants in the easy condition (n = 20) linked one object to one out of two possible responses and participants in the difficult condition (n = 22) linked one object to two out of four responses. Responses were followed by either emotional (happy; disgusted) or neutral (scrambled) faces. Participants´ accuracy rates increased over the course of the experiment, reflecting learning in all conditions. In contrast to our predictions, participants benefited from emotional feedback only in the easy condition. Regarding the ERPs, only the P3b was influenced by task difficulty, showing a frontal shift in the

difficult condition. Interestingly, this is consistent with the idea of a frontal compensatory brain activity in aging research. These results might indicate that at least some cognitive capacity must be available to benefit from emotional feedback, even in younger adults. Potential effects of other emotional states and differences in processing feedback between younger and older adults will be addressed in future research.

Keywords: Reinforcement learning, emotional feedback, feedback processing, FRN, P3b

Presentation type: Poster Presentation

Session: Emotion cognition

Text in comics: Cross-codal information integration during visual narrative comprehension

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Comics are a popular medium to visually convey narratives. How readers comprehend one of their special features – the combination of text and pictures ("cross-codality") – is of theoretical and practical interest for narrative comprehension research. Previous experiments (Gernsbacher, 1985; own unpublished conceptual replication) suggest that building mental representations of narratives and integrating cross-codal information could differentially affect the retention of surface information. We used this surface information retention measure to gain a better understanding of the cognitive comprehension processes for cross-codal information in visual narratives (e.g., Comics, picture stories). We tested whether only complete codality-switches trigger changes in surface information retention or if changes are rather guided by the narrative/content relevance of the cross-codal information. In a preregistered online-experiment (N = 148), participants viewed short picture stories in which the critical panel was shown in 4 variations (2x2 within-subjects design): narratively relevant information was shown pictorially or textually, while accompanying narratively irrelevant information could also be shown pictorially or textually, resulting in either completely pictorial, completely textual, or mixed panels. Participants had to comprehend the stories picture by picture and were tested for the recognition of surface information (i.e., left-right orientation) of the panel before the critical event. Results show an increase in surface information recognition only if both relevant and irrelevant information was switched to text. This indicates that the narrative relevance of cross-codal information might play a subordinate role in comparison to completely switching narrative codality. The implications of additional viewing time analyses will be discussed further.

Keywords: Narrative comprehension, visual narratives, integration, cross-codal, surface information, viewing time

Presentation type: Oral presentation / Talk

Session: Text comprehension

Metamemory judgments do not improve through experimental experience despite optimized feedback

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In judgments of learning (JOLs), participants predict whether they will retrieve an item in a memory test. JOLs rely on multiple cues, some of which are predictive of memory performance (e.g., number of presentations), some are not (e.g., font size). In judgment and decision making research, multiple cue probability learning studies have shown that people can learn to weigh judgment-relevant cues appropriately when they make judgments across multiple blocks with adequate feedback. In each of two experiments, participants completed three study-test cycles with JOLs. In Experiment 1 (n = 160), a typically overweighted invalid cue (font size) and a typically underweighted valid cue (number of future study presentations) were used. In Experiment 2 (n = 80), two invalid cues (font size, fOnT fOrMaT) were varied. In addition, the informativeness of feedback varied between no explicit feedback and very detailed "cognitive feedback" explaining the two cues to attend to, and the average number of words in each category remembered by former participants (or by themselves in Exp. 2) along with hints which features are typically over- or underestimated in JOLs. Whereas performance in the recall tests improved somewhat across study-test cycles, the accuracy of JOLs in terms of resolution was unaffected. An adequate reduction of the effect of font size on JOLs in Experiment 1 was not replicated in Experiment 2. Cue weighting was unaffected by study-test experience, even with highly informative feedback. Hence, we conclude that JOLs are resistant to improvement by experiencing feedback, even if it is optimally informative.

Keywords: Metamemory, multiple cue probability learning

Presentation type: Oral presentation / Talk

Session: Learning and encoding

What grounds singing voice preferences?

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In the visual domain, the relative contribution of object features and viewers' idiosyncrasies to aesthetic judgments is often discussed. In a recent study, we focused on singing performances and examined the contribution of attributes of the voice signal to listeners' liking of pop performances. Concretely, we asked participants to report how

much they liked melodies (a cappella excerpts of “Don’t worry, be happy” and “Over the rainbow”), performed by highly trained female singers. The material was also described in terms of various perceptual features (e.g., vibrato, articulation, tempo etc.) by the same participants and acoustically analysed (e.g., fundamental frequency, jitter, shimmer, etc.). Results indicate that liking can be predicted by perceptual features of the voices (which account for 44% of the variance in liking ratings), but not by their acoustic features. To generalize our findings, we recently constructed a dataset of human vocalizations, consisting of recordings of 22 singers performing six melodies in three different singing styles (as a lullaby, as a pop song, as an opera aria). The dataset has been validated in a forced-choice lab experiment where lay listeners (N = 25 for each stimulus) could discriminate if stimuli sounded as a lullaby, a pop song or an opera aria with mean accuracy higher than 75% for all three singing styles. By using this rich new stimulus dataset in listening experiments, we are currently exploring listeners’ singing voice preferences in a wider context and ultimately drawing a parallel between the visual and auditory domains.

Keywords: aesthetics, liking, acoustics, singing voice, preferences

Presentation type: Oral presentation / Talk

Session: Experimental Aesthetics Following Fechner's Conceptions I

Going beyond the Group Level: Individual Differences in Response Organization in Free Concurrent Dual-Tasking

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From the perspective of cognitive psychology, research on cognitive processes and performance has long been based on highly controlled experimental designs with simple stimuli and an instructed response scheme. Whereas this approach is well-suited to study specific cognitive mechanisms, it severely constraints participants in their way of coping with the given tasks. Importantly, this may obscure how humans would naturally perform tasks to efficiently deal with task requirements at hand. One promising avenue to address this issue, however, evolved in the domain of multitasking. Here, human factors research offers an approach that can serve as inspiration for integrating more degrees of freedom, as it focuses on completely self-organized multitasking in more natural settings. In the talk, I will present the Free-Concurrent Dual-Tasking (FCDT) paradigm, which is inspired by human factors research on task performance. In this paradigm, participants are always provided with a view of all ongoing tasks and may freely choose to which task they want to respond. As a result, the FCDT paradigm provides participants with sufficient degrees of freedom, allowing them to develop their own response strategies and response patterns when coping with multiple tasks. However, in conjunction with fine-grained analyses derived from cognitive psychology, the FCDT paradigm retains enough experimental control to investigate which response strategies individuals develop. After a brief description of the paradigm and how these

strategies can be identified, I will give an overview of their replicability. Additionally, I will sum up the current findings with respect to FCDT and discuss open avenues.

Keywords: divided attention, free-choice, dual-tasking, individual differences, performance efficiency

Presentation type: Oral presentation / Talk

Session: Current directions in free-choice paradigms I: What we can learn from giving more control to the participant

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Spontaneity matters! Network alterations before and after spontaneous and active facial self-touches: an EEG functional connectivity study

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Spontaneous facial self-touches (FST) are a common behavior and often directed to the mucosae, which can pose a risk for self-infection. It is speculated that spontaneous FST serve cognitive or emotional regulating mechanisms, however, function and trigger of spontaneous FST are still not clarified. Since it is time-consuming to wait for spontaneous FST in experiments, the question came up, whether spontaneous FST affect the brain similarly as FST prompted by the experimenter (active FST). To approach this question, we compared EEG-based brain connectivity before and after spontaneous and active FST. As a cover story, we asked participants to manually explore and maintain haptic stimuli for a 14 minutes-retention interval. Afterwards participants were asked to draw the shapes. At the end of the experiment, the participants were prompted to perform active FST. To spot and analyze FST, performed during the retention interval, we recorded tri-axial accelerometer, EMG-, video- and EEG-data. Comparing connectivity between pre- and post-spontaneous FST revealed tremendous differences. Few connectivity differences were observed between pre- and post-active FST. These results indicate that spontaneous FST affect other brain networks than active FST and not only sensomotoric networks. Comparing the respective pre- and post-states of spontaneous and active FST, revealed less differences between the post- than the pre-periods. These results indicate that spontaneous FST might serve a network regulatory mechanism. Whether other motor activity (spontaneous movement and body touches) affect the brain similarly as spontaneous FST is subject of our current project and will be presented during the talk.

Keywords: Self-touch, EEG, Connectivity, Regulation, Cognition, Emotion

Presentation type: Oral presentation / Talk

Session: Emotion and cognition

Moving Tactile Cues on Human Torso Expand Perceived Time

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Spatially congruent visual cueing prolongs the perceived duration of visual stimuli (Seifried & Ulrich, 2011). Additionally, moving visual cues compared to static cues expand perceived duration in a particularly effective manner. Previously, we showed that a congruent vibrotactile cue on the human torso similarly expands perceived duration of a subsequent tactile stimulus. In the present study, we investigated how movement and spatial congruency of the tactile cue influence perceived duration on the human torso. To this end, we used dynamic and static vibrotactile cues. The dynamic cue composed of successive vibrotactile stimulation from neighboring actuators starting from the middle-lower abdomen and finishing at the upper chest while the static cue was a simultaneous vibrotactile stimulation through the same actuators (middle-lower abdomen to upper chest). Both cues lasted 250 ms and were either presented spatially congruent (left or right torso) or incongruent with the stimulus. In a temporal bisection task, participants categorized the duration of each stimulus (300 - 800ms) as short or long in reference to previously learnt durations. Perceived duration was longer after dynamic cues as compared to static cues. However, the spatial congruency of the torso side (left vs. right) did not influence the perceived time. We suggest that tactile attention stretches perceived time on the human torso, and that it is particularly efficiently caught by dynamic cues independent of the exact location.

Keywords: motion, tactile perception, timing, time perception

Presentation type: Oral presentation / Talk

Session: Spatial and temporal perception

Disgust Related Memory Bias in DRM Paradigm: Comparison with Fear

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Several studies reveal that disgust has a memory advantage. This advantage occurs when disgust stimuli are compared with neutral stimuli as well as fear stimuli. Since disgust and fear are both avoidance-oriented and negative emotions, the memory difference between these two emotions became important in the literature. Although disgust and fear were compared in different memory procedures, the comparison between them was not studied in the DRM paradigm for false memory. In the current experiment, 71 (40 female; 31 male) university students participated the study. A total

of 10 DRM lists (five for each) with 10 words were developed and presented to the participants via PsychoPy. In the development of the lists, the Turkish version of Affective Norms for English Words was used. Participants went through a classical DRM experiment with immediate recognition. A 2(emotion: disgust, fear) x 3(word type: critical lure, old words, new words) two factor repeated measures analysis of variance conducted. The significant main effect for emotion and word type as well as the interaction of emotion and word type was found ($p < .05$). Paired samples t-test was conducted to compare the groups. There was a significant difference between disgust and fear in all word types. Participants demonstrated lower false memory and better memory performance on disgust. In the light of the findings, it can be stated that disgust has a memory advantage over fear in false memory. These results give evidence for the notion that disgust memory bias is a pervasive phenomenon.

Keywords: disgust, fear, DRM, false memory

Presentation type: Oral presentation / Talk

Session: False information and memory

Cortical feedback dynamics in the alpha frequency range support coherent natural vision

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Our eyes constantly receive complex visual information about the environment across the whole visual field. To form coherent visual experiences, the brain must integrate these inputs by their spatiotemporal regularities. Here, we tested whether and how the integration processes are mediated by oscillatory neural activity using spectrally resolved EEG and spatially resolved fMRI measurements. We hypothesized that spatial integration is governed by low-frequency (alpha/beta) rhythms linked to top-down modulations of sensory processing. In separate EEG and fMRI experiments, participants viewed short video clips (3s) depicting everyday situations through circular apertures in the right and left visual fields. We manipulated the spatiotemporal congruency of the videos shown through the two apertures, so that they could or could not be integrated into a coherent percept. Using frequency-resolved decoding on the EEG data, we found that cortical representations shifted from feedforward-related gamma activity when videos were spatiotemporally inconsistent to feedback-related alpha activity when they were spatiotemporally consistent, suggesting a critical role of feedback processes in integrating spatially distributed inputs into a coherent percept. Further, combining the EEG data with spatially resolved fMRI recordings in a multimodal representational similarity analysis framework, we demonstrate that alpha-frequency feedback is directly associated with representations in early visual cortex, suggesting

that rhythmic feedback reformats early visual representations of coherent natural inputs for efficient processing in downstream regions. Together, our results elucidate a mechanism for multiplexing feedforward and feedback information in cortex that enables coherent real-world vision.

Keywords: cortical alpha rhythms; top-down modulation; multivariate pattern analysis; EEG-fMRI fusion

Presentation type: Poster Presentation

Session: Scene perception

Influences of delayed visual feedback and accuracy feedback on duration reproduction

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Subjective time can be different from physical time because of the surrounding contexts or what senses we use (Bueti, 2011). Motor, for example, has different timing mechanisms as sensory timing (Tsao et al., 2022). In the perception-action loop, motor timing is coupled with multisensory timing and feedback. How we incorporate different timing and feedback remains controversial (Repp & Su, 2013). We conducted two experiments on duration reproduction, manipulating delay adaptation and accuracy feedback. Experiment 1 compared reproduced durations with 150-ms delayed visual feedback and no-delayed visual feedback, which showed that after adaptation, participants implicitly incorporated 60% of the delay into their reproduction. And without accurate feedback, the duration was overestimated by 10%. Experiment 2 compared with and without accurate feedback after the reproduction, which revealed that without accurate feedback also inflated the estimate by about 10%, both for the sub-second and super-second durations, consistent with the finding of Experiment 1. Our findings suggest that sensorimotor timing is influenced by the integration of motor timing and multisensory timing and the attentional sharing between action and perception. Attention to action, even if it is time-related, may divert attention away from the timing, causing some inflation in the reproduction, when the accuracy feedback is absent.

Keywords: time perception, sensory-motor integration, delay adaptation, accuracy feedback

Presentation type: Poster Presentation

Session: Stimulus-response and response-effect binding

Valence in Feature and Conjunction Search

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In two prior studies, we observed that the subjective liking acquired through evaluative conditioning affects visual search times, in particular when set size is changing (presented at TeaP 2022, Cologne). In the present study, we test whether conditioned valence affects visual feature and conjunction search to the same extent. Specifically, if evaluative conditioning induces a bias in bottom-up attentional control, (i.e., changing the stimulus salience), then it may be expected to affect conjunction search more than feature search because feature search is already characterized by clear salience difference between the targets and distractors. Therefore, stimuli were paired with either positive, negative or neutral images in an evaluative conditioning phase prior to being used as target stimuli. In the subsequent visual search task, sixteen stimuli were placed on the screen containing the target or not. In the feature search condition, the target differed from the distractors in only one feature (e.g. colour), while two features were relevant to identify the target in the conjunction search task. As a result of successful evaluative conditioning, the acquired valence of targets was either positive, negative, or neutral, whereas distractors had not been presented previously to the participants. Positively evaluated targets were found slightly faster than neutral and negative targets in the visual search task, and this effect did not differ as a function of whether it was a feature or conjunction search task. Limitations of the study, such as the conditioning material used, are discussed.

Keywords: evaluative conditioning, visual attention, feature search, conjunction search

Presentation type: Poster Presentation

Session: Visual attention

Evidence Accumulation Models for Unimodal and Skewed Payoff Environments

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Sequential sampling models are one of the most dominant cognitive accounts in psychological research. These models assume decision makers accumulate evidence as a running sum of the observed evidence strength, until an absorbing decision boundary is reached. We test this summation-based model's predictions in a value-based binary choice task with skewed (multimodal) and unimodal numerical payoff distributions. While previous studies tend to focus on the latter, we show that in such settings, summation-based models predictions mimic alternative accounts. One such alternative is a retrieval-based accumulation model, integrating insight from the Decisions from Experience and sequential sampling literatures. This simplified model assumes agents integrate evidence from memory, retrieving outcomes previously experienced in the most similar settings. Importantly, the predictions of the summation-based and retrieval-based models diverge in skewed settings, as they predict overreaction and underreaction to extreme observations, respectively. In Study 1,

participants faced 60 different sequential sampling tasks, choosing between a unimodal (gaussian) option (e.g., “draw from ~N(8, 10)”) and either another unimodal option (e.g., “draw from ~N(16, 10)”), a left-skewed option (e.g., “draw from ~N(0, 10) with p = .9, ~N(160, 10) otherwise”) or a right-skewed option (e.g., “draw from ~N(16, 10) with p = .9, ~N(-144, 10) otherwise”). Results favor our retrieval-based accumulation model, including the prediction for the distinct impact of rare extreme observations. In Study 2, a reanalysis of a previous dataset clarifies the advantages of our model. We conclude with a discussion of the optimality, ecological validity, and feasibility of the retrieval-based accumulation account.

Keywords: Sequential sampling, Reliance on small samples, Decision from experience, Cognitive modelling

Presentation type: Oral presentation / Talk

Session: Strategic information search in inferences and decisions under uncertainty

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Predicting age differences in auditory distraction based on perceptual filtering and working memory capacity

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Health and Medical University Potsdam

The duplex mechanism account postulates two functionally distinct forms of auditory distraction in short-term memory. The changing-state effect is associated with task-specific interference of perceptual changes in acoustical stimuli and deliberate serial-order processing. In contrast, the auditory deviation effect is supposed to be due to a more general diversion of attentional resources, which is more dependent on individual cognitive control capacities. Here, we test the hypothesis that the changing-state effect is related to perceptual distractor filtering, whereas the deviation effect is related to working memory capacity. While both the ability to filter distractors from further cognitive processing and the working memory capacity are assumed to decline with age, the empirical evidence for differences in the two forms of irrelevant sound effects between younger and older adults is inconclusive. The aim of the present study is to predict the age differences in the changing-state and deviation effects based on individual differences in distractor filtering and working memory capacities. Therefore, two age groups (18 to 30 years and over 60 years) completed a serial and non-serial short-term memory task while being exposed to different types of irrelevant sound. In line with previous findings, individual differences in working memory capacity (i.e., operation span) were related to the auditory deviation effect, but not the changing-state effect. In addition, participants distractor filtering abilities, as measured with an auditory flanker task, predicted the size of the changing-state effect.

Keywords: changing-state effect, deviation effect, irrelevant sound effect, auditory distraction, working memory capacity, perceptual filtering

Presentation type: Poster Presentation

Session: Memory and working memory

Language switching interacts with morphological configuration switching between and within trials

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The morphological configuration of a word refers to the organization of the morphemes, which can vary both within and across languages. It is variable for example in two-digit number names (like twenty-one, is the decade or the unit named first) or in compound words (like spiderweb, is the modifier or the head named first). In this study, we combined repeating vs. switching the morphological configuration and language switching. In three experiments (Ns = 48), participants switched between languages in either a language-production task (i.e., naming two-digit numbers or compound words) or a language-comprehension task (i.e., typing an auditorily presented two-digit number). In all experiments, a language-repetition benefit was mainly observed when also the morphological configuration repeated from one trial to the next. In a fourth experiments (n = 48), participants were asked to translate an auditorily presented two-digit number. Thus, each trial included a language switch between the source language (always English) and the target language (German or Spanish). Additionally, the target language could repeat or switch in two subsequent trials. Again, a benefit of repeating the (target) language from one trial to the next was influenced by repeating vs. switching the morphological configuration of the words. The (target) language-repetition benefit was reduced (or even reversed) by a morphological configuration switch 1) in the source language from trial to trial and 2) from the source to the target language. Taken together, these experiments demonstrate that grammatical information as the morphological configuration play a critical role in language switching.

Keywords: Language switching, Bilingualism, Language production, Language comprehension, Translation

Presentation type: Oral presentation / Talk

Session: Memory, Speech and language processing

Predictive information based on conditional oddball repetition facilitates detection performance.

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The human auditory system is thought to represent regularities inherent in auditory information in internal predictive models. Sounds not conforming to an established regularity (deviants) elicit prediction error signals in the brain, alerting the auditory system to information not explainable based on currently active models. Here, we examine the widely neglected characteristic of deviants bearing predictive information themselves. In a modified version of the oddball paradigm using higher-order regularities, we set up different expectations regarding the next sound following a deviant. In a deviant detection task, participants listened to an oddball sequence including two deviant types following diametrically opposed rules: one deviant occurred mostly in succession (high repetition probability) and the other mostly in isolation (low repetition probability). To probe whether explicit knowledge facilitates rule extraction, participants in Experiment 1 were naïve, whereas in Experiment 2 they were made aware of the rules. In both experiments response times significantly decreased from first to second deviant when repetition probability was high – albeit more in the presence of explicit rule knowledge. There was no evidence of a facilitation effect when repetition probability was low. Significantly more false alarms occurred in response to standards following high compared to low repetition probability deviants, but only when participants were aware of the repetition rules. These findings provide evidence that deviants can be integrated into predictive models, enabling predictions about auditory events in the imminent future. More generally, this new paradigm may provide further insights into the predictive properties of the human brain.

Keywords: oddball, deviant, auditory perception, predictive processing

Presentation type: Poster Presentation

Session: Auditory processing

Time for a shift. Behavioral approaches to online learning evaluation

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Digital learning materials are on the rise in higher education settings (Treve, 2021; Zawacki-Richter, 2021). This implies a growing need for research on how they should be designed to assist learning effectively (Sailer & Schlag, 2012). Therefore, our project aims at exploring whether empirical behavioral methods can provide a more valid insight into realistic learning processes. Furthermore, we will try to identify facilitating factors for learning with digital learning materials. One factor under consideration are emotions since they have proven to be influential factors on learning (Pekrun et al. 2017; Tnyg et al. 2017). Our current study investigates how eye tracking and analysis of emotional facial expressions might be used to assess differences in learning behavior in applied educational settings. Regarding emotions, we hypothesize that coded emotional face expressions will differ between types of information presentation (i.e. text, figures or videos). 70 students were observed in a laboratory setting while working through authentic digital learning material. Eye movements and portrait face videos were

recorded. Self-report data on positive and negative affects while learning and motivational factors of technology implementation (Gorovoj, 2019) were collected. For data analysis automated coding of facial emotion expressions will be combined with eye movement cues on the focus of the participants attention. Data analyses are still in progress. We would like to discuss potentials and limitations of introducing behavioral measures to research in higher education.

Keywords: FACS, emotions, eye tracking, education, digital learning, learning behavior

Presentation type: Poster Presentation

Session: New media and machine interaction

Through the lens of a language: Is there a sound-symbolic functional load?

Aleksandra Cwiek

Leibniz-Zentrum Allgemeine Sprachwissenschaft

The study of Pokémon names in sound symbolism is an effective way to look at the relationship between certain sounds and their corresponding characteristics. Pokémon usually have different names across languages, but their traits – e.g., height, weight, power, etc. – remain the same. In this talk, I will present the first-to-date study on German Pokémon names, which I will relate to analyses of languages such as Japanese, English, or Mandarin Chinese (Kawahara et al., 2018; Shih et al. 2018; 2019). Even though those previous analyses often signaled similarities in sound-symbolic expression across various languages, the current comparison exposes a number of differences, which I will demonstrate in detail during the presentation. To explain those differences, I re-interpret the functional load hypothesis in a novel way – for the purpose of sound-symbolic expression. In phonology, the functional load is ascribed to features in a given language that distinguish meaning. A feature with a high functional load is more essential to distinguishing meaning than a feature with a low functional load, e.g., in English, the vowel contrast has a high functional load, but the tone has a low functional load. I propose that, in sound-symbolic research, the starting point should be the features of a given language. Looking from the perspective of individual languages, it is possible to find overarching iconic correspondences. These are, however, expressed differently depending on the language but rely on similar acoustic and articulatory characteristics.

Keywords: sound symbolism, iconicity, cross-linguistic, Pokémon, functional load

Presentation type: Oral presentation / Talk

Session: Sound Symbolism: Phenomena, Methods, and Psychological Processes

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Implementing multi-session learning studies out of the lab: tips and tricks using OpenSesame

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OpenSesame is a user-friendly experimental tool that is open source and runs on Windows, MacOS, and Linux. Here, we provide tips and tricks for running multisession experiments out of the lab using OpenSesame. We focus on learning experiments that involve the measurement of reaction times and complex quasi-randomized orders of stimuli controlling item transitions. Learning experiments pose specific challenges: how to access individual identifying numbers; how to access session numbers; and how to counterbalance conditions across participants. This article includes helpful codes and provides hands-on information for implementation that will be useful also outside of the presented use case. The aim of this article is to facilitate the creation of multisession learning experiments even with little technical expertise. We conclude that out-of-the-lab experiments are a valid alternative to traditional lab testing.

Keywords: OpenSesame, repeated testing, cognitive load, serial reaction time task

Presentation type: Oral presentation / Talk

Session: Conducting and implementing experiments

Social attention in social contexts

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Humans tend to shift their attention according to others' eye-gaze direction (i.e., gaze cueing of attention). This is a core ability, as it permits the creation of pervasive relationships among individuals and with the environment around them. In the beginning, this form of social orienting was considered a reflexive phenomenon, but in recent years evidence has shown that it is also permeable to several social factors related to the observer, the individual depicted in the cueing face, and the relationship between them. In this talk, I will discuss some recent cross-cultural studies exploring the impact of racial group membership on gaze cueing of attention.

Keywords: social attention, gaze cueing, group membership

Presentation type: Oral presentation / Talk

Session: Cognitive building blocks in social contexts

Repeated Failures to Obtain Directed Forgetting Effects for Stimulus-Action and Stimulus-Classification Associations in Lab and Online Samples

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Responses are generally faster for items that repeatedly require the same, previously-executed as opposed to a different response (repetition priming effect). This finding is explained by stimulus-response (S-R) associations which are formed when stimuli and responses co-occur and thus bind together. S-R associations can be divided into two components: Stimulus–action (S-A) associations between stimuli and motor outputs and stimulus–classification (S-C) associations between stimuli and their task-specific semantic classification. In the present work, we tested the impact of instructing participants to intentionally remember or forget the stimulus at encoding and/or retrieval of associated actions and classifications. We discuss five attempts to obtain directed forgetting of repetition priming effects using the list-method method (Experiments 1 + 2) as well as the item-method of directed forgetting (Experiments 3-5). The absence of S-A repetition priming effects in half of our experiments suggests that an additional memory instruction hinders the formation of robust S-A associations frequently observed in other studies. This finding implies crosstalk between declarative (remember the stimulus) and procedural (act upon the stimulus) memory. Further, despite variations in samples (lab + online experiments) and design, we observed no standard directed forgetting effects for incidentally-learned, stimulus-based associations. Thus, intending to forget a stimulus does not impair the retrieval or encoding of an associated action or classification. Rather, an additional memory task (remembering or forgetting) per se appears to interfere with the encoding of S-R associations.

Keywords: directed forgetting, binding, stimulus-response associations

Presentation type: Oral presentation / Talk

Session: Binding

Exploring the relationship between eye movement behaviour and aesthetic pleasure ratings of natural scenes

Claudia Damiano, Johan Wagemans

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We know that people tend to prefer nature over urban environments, but is all nature created equal? Here we compared different types of natural environments in terms of aesthetic pleasure and exploration behaviour. Each participant viewed 78 images from

one of three natural categories (beaches, forests, deserts) or an urban category (cities). After viewing each image, participants rated how much they enjoyed looking at that image. We found that the cities are preferred less than beaches and forests, but not deserts. Thus, although deserts represent a natural environment, they do not elicit as much pleasure as other natural environments. Several eye movement measures were also recorded. At a general level, aesthetic preferences for real-world scenes seem not to be related to overall eye movement behaviour, as both beaches and cities are explored more thoroughly (i.e., greater number of fixations, longer saccades) than forests and deserts despite their diverging aesthetic scores. However, image-by-image, visual exploration does relate to aesthetic judgements, though this pattern differs by scene category. For beaches and forests, greater exploration positively relates to aesthetic ratings. This is not the case for cities and deserts, where there is no significant relationship between visual exploration and aesthetic ratings. Taken together, these results imply that images which contain moderate amounts of information to explore may be seen as more interesting and therefore aesthetically pleasing. However, too much (e.g., in cities) or too little (e.g., in deserts) information may be deemed too overwhelming or boring, respectively, and therefore not as aesthetically pleasing.

Keywords: aesthetics, eye movements, exploration, natural scenes

Presentation type: Oral presentation / Talk

Session: Experimental Aesthetics Following Fechner's Conceptions II

Social Influence on Exploration/ Exploitation Strategies in Bandit Tasks

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Bremen University

Multiple real-world scenarios require decision makers to trade off exploration (i.e., information seeking behavior) against exploitation (i.e., usage of present knowledge to maximize some kind of reward). Such agents are sometimes informed about and influenced by the whereabouts of other agents facing the same task. This type of social learning can as well help to enhance the agents' performance, as it can be either ignored or overly relied on. E.g., in search and rescue scenarios, various agents explore, while being in touch with others. Restless bandit tasks provide an environment in which participants face the exploration exploitation trade-off constantly. Therein, participants have to maximize their reward height by choosing between multiple options ("bandits") constantly changing in regard to the quality of their outcome. The current research investigates in two experiments how seeing fictitious other participants choices influences the way participants tackle the trade-off. Therein, participants saw either highly explorative or highly exploitative choice sequences. Copying behavior and individual exploration behavior are disentangled using a novel reinforcement learning model which links the likelihood of copying to the uncertainty of the participants: the Kalman copy-when-uncertain model. First results indicate that the copy when uncertain model outperforms comparable models. The level of exploration expressed in the social

information impacts the copy behavior and the success of the participants. Results on differential effects of different types of social information remain yet inconclusive. Applications of this research include team-wise exploration of spatial environments and the prevention of myopic strategies in team work.

Keywords: Social Learning, Exploration / Exploitation, Decision-Making, Computational Modeling, Bandit Task, Information Seeking

Presentation type: Oral presentation / Talk

Session: Emotion and cognition

Stimulus-unspecific improvements of task-order coordination mechanisms in dual-task situations

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In dual-task (DT) situations task-order coordination (TOC) processes are required to schedule the bottleneck-processing of component tasks as had recently been shown by observations suggesting increased TOC-costs in DT situations comparing variable against fixed order of component tasks. The current study investigated whether TOC-processes can be improved by training and whether such improvements can operate on a stimulus-unspecific, i.e. higher-order, processing level or not. For that purpose, participants trained the same two visual-manual component tasks in four different groups, each of which having various requirements on TOC-processes. In pre- and post-training sessions, we compared the TOC-costs between the different training groups for situations with unchanged and with untrained stimuli to test for (stimulus-unspecific) training-related improvements. Results demonstrate that TOC were improved (i.e., reduced TOC-costs) for participants who trained flexibly to change processing order compared with participants who did not train such flexibly changing order processing. Importantly, the improvements could be shown for situations with new, untrained stimuli, which is indicative for the operation of training on a stimulus-unspecific processing level. The results are consistent with the Efficient Task Instantiation (ETI) model, which states that two task sets can be conjointly instantiated in working memory after practicing the two corresponding component tasks in DT situations. We assume that training of flexibly adapting the processing order of two component tasks can lead to an efficient, conjoint instantiation of both potential task orders on a higher-order stimulus-unspecific level which can guide efficient task-order scheduling independently on the specifically presented stimuli.

Keywords: dual-tasking, multitasking, training, task order

Presentation type: Oral presentation / Talk

Session: Dual tasks and action control

Mu-Suppression neurofeedback trains the mirror neuron system in neurotypical humans

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Neurofeedback training (NFT) is a promising adjuvant therapeutic method in many neurological and psychiatric disorders. The desynchronization of mu rhythm (8-13 Hz) over centroparietal areas is known as a valid indicator of mirror neuron system (MNS) activation in the electroencephalogram (EEG) and has been associated with social skills. Still, the effect of neurofeedback training on the MNS requires to be well investigated. The present study examined the possible impact of NFT with a mu suppression training protocol in 16 healthy neurotypical participants during 11.25 hours and 15 NFT sessions. The participants took the "Reading the Mind in the Eyes Test" (RMTE), plus EEG recording experiments before and after NFT. Pre and post-training EEG source reconstruction analysis revealed a statistically significant mu suppression across the MNS-attributed areas after NFT. The frequency analysis showed mu suppression after neurofeedback without any statistically significant difference. At the behavioral level, the accuracy of RMTE scores did not suggest an effect of NFT on the ability to interpret subtle emotional expressions. Still, a significantly reduced response time was seen after the NFT. In conclusion, the Mu suppression NFT successfully induced mu suppression in the MNS-attributed areas, mainly while observing hand movements, along with partially positive behavioral results. Considering that the average time of NFT mentioned in the literature is around 30 hours, a more extended training period is necessary to induce mu suppression during social scenarios and involve social interaction brain areas.

Keywords: mu suppression, mirror neuron system, neurofeedback, EEG

Presentation type: Oral presentation / Talk

Session: Emotion and cognition

The Mentor Perspective: What Makes and Breaks a School-Based Talent Development Mentoring for Youth?

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Recommendations regarding school-based talent development programs (Gagné, 2015) can be particularly well-realized in mentoring. Yet, little is known about how individual and environmental conditions influence mentoring effectiveness in these contexts. To examine factors associated with mentee engagement and learning gains, we analyzed qualitative and quantitative mentor data gathered during the pilot phase of the Learning Pathway Mentoring program. The program is a structured, school-based, one-on-one mentoring intervention aimed at students (mentees) who demonstrate high potential and motivation for a specific talent domain (a school subject such as mathematics). Mentees are mentored for up to three years in their talent domain by a teacher from their school (mentor) who teaches the respective subject. Preliminary findings drawn from written reports (N = 46) and quantitative online survey data (N = 62) underline the importance of a good mentee-program-fit, as well as dyadic and environmental factors. The strongest predictors for mentor-reported mentee learning gains were concrete plans of mentee at mentoring start (r = .46, p < .001), parental support (r = .44, p < .001), and perceived similarity between mentee and mentor (r = .44, p < .001). Implications of these findings regarding the implementation of effective mentoring programs for talent development in school settings will be discussed. References Gagné, F. (2015). Academic talent development programs: A best practice model. Asia Pacific Education Review, 16, 281–295. https://doi.org/10.1007/s12564-015-9366-9

Keywords: talent development, school-based mentoring, gifted education

Presentation type: Oral presentation / Talk

Session: Learning and memory retrieval

Mouse movements on-screen are an alternative to gaze in VR

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What if we could save on instruments, material and time by studying gaze during high-order cognitive tasks via mouse movements on screen? We ran visual search tasks in interactive 3D-modelled indoor rooms. Search targets were placed either outside or inside containers (e.g., fridge, cupboard) in 3D real-world scenes. In two phases participants first searched for outside-only targets, then for a mix of inside and outside targets. One group of participants accomplished the task in VR, another group went through it online on their personal computer, controlling the camera-view with their mouse and keyboard. We sampled eye-in-space data in one case, and mouse movements in the other. The novelty of our approach is processing mouse data like we usually do gaze: we used a gaze-parsing algorithm based on velocity and relative angles to identify pseudo-fixations and pseudo-saccades. Interestingly, the pseudo-gaze mimicked dynamics of real saccades and fixations (e.g., main sequence, distribution shapes). Behaviorally, we observed comparable results regarding visual

search phases (initiation, scanning, and verification) and interactions with the environment. Effects related to searching for inside vs. outside objects were as apparent in both mouse and gaze data. We believe that the same high-order gaze dynamics, such as exploring and analyzing the scenes, translate to mouse movements. Our aim is not for experimenters to forgo eye in favor of mouse tracking, rather we wish to promote more in-depth analysis of another source of data - possibly as complex as gaze - that can easily be implemented in on-screen (online) protocols.

Keywords: data analysis, mouse, on-screen, gaze, virtual reality

Presentation type: Oral presentation / Talk

Session: Applied attention

Tactile signals underlying slip detection and avoidance during active manipulation of objects.

Benoit Delhaye

ICTEAM, Université catholique de Louvain, Louvain-la-Neuve, Belgium

Tactile interactions between the fingertips and an object induce localized slip events that are thought to provide information about grasp stability. In this talk, I will show how human tactile afferents signal those events. Furthermore, I will provide evidence that such events trigger reactive grip force to avoid slip during active manipulation.

Keywords: Touch, tactile afferent, biomechanics, dexterous manipulation

Presentation type: Oral presentation / Talk

Session: Touch in context: from the body to the external world

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Identifying Alterations in Error-Driven Learning that are Specific to Psychotic-Like Symptoms

Kelly Diederen

King's College London

Altered error-driven learning may be a promising marker of psychosis as it is underpinned by dopamine, the main neurotransmitter implicated in psychosis. Error-driven learning can be assessed at scale with limited costs through online testing. To determine the potential of this marker, it is crucial to ensure that the observed alterations are unique to psychotic symptoms. Here, we set out to disentangle psychosis-specific symptoms, from those occurring in relation to depression and anxiety. A novel 'game' was developed as a measure of error-driven learning in the general population. Participants were required to catch pieces of space junk; the locations of which they

could learn through trial-and-error. However, successful performance also required participants to arbitrate whether trial-wise variation in the space junk location was the result of noise, or an unexpected change in the task's outcome contingencies. Higher scores on delusional ideation were associated with decreased learning and performance across all levels. There was a significant interaction with task level, revealing that decreases in learning and performance associated with delusions were most pronounced at the level that contained gains and losses. Depressive symptoms and anxious arousal were associated with improved learning and performance across all trials, and an attenuated decrease in task performance at the level that contained gains and losses. The results indicate a clear dissociation between alterations in error-driven learning that are linked to psychotic-like symptoms versus those that relate to symptoms of depression and anxiety, thus stressing the potential of altered error-driven learning as a marker of psychosis.

Keywords: Transdiagnostic approach, Learning, Computational modelling, Online assessment, Biomarker

Presentation type: Oral presentation / Talk

Session: Computational psychiatry: Identifying the fine-grained behavioural mechanisms underlying symptoms in psychosis and internalising disorders

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When does selecting out conscious trials create regression to the mean?

Zoltan Dienes

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In implicit cognition research a standard strategy is to measure the conscious status of knowledge on each trial (e.g. with confidence or visual clarity ratings (PAS), or structural knowledge attributions) and then sub-select the trials where the knowledge is measured to be unconscious. If the accuracy is above chance that is taken to be evidence for unconscious knowledge. David Shanks has pointed out the problem of regression to the mean when people or trials are sub-selected: Because of the ubiquitous possibility of error in measurement, when a selection is made on the basis of one variable (e.g. conscious vs unconscious structural knowledge), the actual value of that variable will be closer to the mean than the measured value. Thus, trials selected to be based on unconscious structural knowledge will actually have some conscious structural knowledge. Does this critique undermine the use of trial by trial measurement, such as structural knowledge attributions in implicit learning (or confidence or PAS in subliminal perception)? I show that it does not. I show how to quantify the actual effect size that could be produced by regression to the mean in any given situation, how it may be so small as to be meaningless, and how to deal with it when it is of a decent size, using Bayes factors with an interval null hypothesis.

Keywords: implicit cognition, regression to mean, Bayes factor

Presentation type: Oral presentation / Talk

Session: New methodological approaches to measuring unconscious mental processes

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The impact of executive functioning and age-related cognitive decline on distraction from pain

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Older people, suffering from pain and its consequences more often than younger people, would benefit significantly from non-pharmacological pain treatment. So far, little is known about how age affects psychological pain modulation strategies. Preliminary findings hint towards a less efficient pain inhibition through cognition-based pain modulation strategies, as cognitive distraction from pain. Here, executive functions (EFs) have been considered a key factor in the age – pain relationship, with age-related cognitive decline in EFs being associated with reduced pain relief through distraction in older adults. We investigated influence of four core EFs on distraction from pain in aging. In a two-session design, healthy young (18-30 years) and older participants (60+ years) performed a Go-Nogo task, the Stroop-Color-Word-Task, the Sternberg-Task, and the Attentional Network Task. Afterwards, participants performed a pain distraction task, namely a n-Back working memory task with low and high cognitive load, during which participants received individually adjusted transdermal electrical pulse trains in non-painful and moderately painful intensities to the inner forearm. Ratings of intensity and unpleasantness were collected and stimulus-related (EF tasks) and pain-related evoked potentials were recorded with a 64-channel EEG. Unexpectedly, first analyses on the currently small sample suggest a more efficient pain relief through distraction under low relative to high cognitive load in older adults. The distraction effect was related to EFs, some of which showed age-related cognitive impairment. Our findings could lead to a better understanding how to adapt pain treatments in this population by including selective cognitive trainings and optimizing distraction task difficulty.

Keywords: aging, pain modulation, distraction from pain, executive functions, age-related cognitive decline, EEG, ERP

Presentation type: Oral presentation / Talk

Session: Pain and Aging

Was it the bear or the lion? Evaluating different disambiguation cues in pronoun interpretation

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In a sentence like “The bear disturbed the lion because it was aggressive”, known as a Winograd schema (Winograd, 1972; Levesque, 2017), the pronoun “it” is usually interpreted as referring to the bear (NP1) and not to the lion (NP2). This interpretation is on the one hand based on the meaning of the interpersonal verb in the main clause, which offers an implicit causality bias of who the cause of the action is and thus to whom the pronoun refers. On the other hand, the interpretation is affected by the adjective that appears at the end of the sentence. We investigated how the pairing of specific verbs and adjectives modulates the interpretation of pronoun reference. We presented sentences including verbs biasing NP1 or NP2 (see Ferstl et al., 2011). We picked adjectives which presumably are more compatible with pronoun reference to NP1 (first example) or NP2 (e.g., “The bear disturbed the lion because it was exhausted”). Subsequently, a second sentence paired one of the two NPs with the adjective (e.g., “The bear was exhausted” vs. "The lion was exhausted”). Participants judged the coherence of the two sentences. Judgement revealed a strong verb bias replicating the results of Ferstl et al. (2011) for German verbs. Moreover, incompatible verb-adjective pairs were judged to be less coherent than compatible verb-adjective pairs. The results show that verb bias and adjective meaning together provide meaningful cues for resolving ambiguous pronoun reference.

Keywords: ambiguity, reference, implicit causality, discourse comprehension

Presentation type: Poster Presentation

Session: Language

Reasons to switch - How errors guide decision making in multitasking

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Why do humans decide to switch or repeat a task? Suppose that the purpose of decision making is to maximize reward and minimize potential costs. Furthermore, suppose that agents learn about potential rewards and costs through trial-and-error. For example, incorrect responses may indicate that the current task is too difficult, suggesting to switch tasks, or, alternatively, wrong responses may indicate a lapse of attention unrelated to the task, suggesting to repeat. Here, we focus on the effects of errors on voluntary task choices. We developed a novel adaptive voluntary task switching paradigm and hypothesize that errors are cues which inform task choices. Based on theories of error processing, we derived five statistical models of how errors might influence voluntary task choices. We show that choice behavior was best explained by

a combination of error probability of the performed task, error probability of the alternative task, and whether the previous response was correct or incorrect. This suggests that agents can integrate potential costs in a joint utility function guiding decision making.

Keywords: Cognitive Control; Errors; Decision-Making; Multitasking

Presentation type: Oral presentation / Talk

Session: Current directions in free-choice paradigms I: What we can learn from giving more control to the participant

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The encoding of touch during active exploration of natural textures

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Humans typically use medio-lateral movements of the fingers to explore surfaces. In such a movement, the finger pad is compressed against the surface, stretched, then slides over the surface, eliciting high frequency vibrations, and is finally unstretched. This cascade of mechanical events stimulates mechanoreceptors in the skin, which transform physical events into a neural code, informing us about the qualities of surfaces/objects. Neurophysiological studies performed to define the neural code at peripheral level have described how the spatial details of textures (e.g. Braille dots) or the vibratory aspects of the skin/surface interactions are coded in animals and humans using stimuli applied passively. We aimed to investigate how the dynamics of a naturally-produced lateral movement over a texture shapes the mechanoreceptive afferent responses to deliver a meaningful touch percept. Using microneurography in humans, we recorded neural responses of mechanoreceptors during active touch of a variety of natural textures, at different speeds of exploration. Our results reveal a specific pattern of neural responses within movements, with the slow adapting mechanoreceptors (SAs) responding optimally at movement initiation/termination, and fast adapting mechanoreceptors (FA) responding optimally during sliding. Furthermore, in a subset of afferents, we correlated firing with physical and perceptual descriptors. These relationships suggest that a subset of SAs (SA2) code the friction coefficient of the texture, while FAs code the vibratory aspects. Finally, FA firing increased with faster movement speed, while SAs were relatively insensitive to changes in speed. These findings expand current knowledge on the neurophysiology of touch in humans.

Keywords: microneurography, active touch, afferent fibers, mechanoreceptors, friction, vibration, humans

Presentation type: Oral presentation / Talk

Session: Touch in context: from the body to the external world

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The Effects of Fear vs. Anger on Emotional Stroop Tasks in Young Adults

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Managing cognitive control is similar to managing an orchestra and sometimes cognitive control and emotions interfere with each other more than we think. This study is interested in emotion-related cognitive control tasks such as Emotional Stroop Tasks (EST). The Discrete Emotions Theory defends that each basic emotion stems from different sources (Ekman et al., 2011). The Motivational Model concentrates on emotions' motivational instincts: approach or avoidance behavior (Lang et al., 2008). Anger and fear are both negative emotions but anger has approach motivation fear has avoidance. Therefore, to test this situation EST used in two forms: EST with emotionally-loaded words (EST-w) and EST with emotional face pictures (EST-p). PsychoPy 3 was used to set up experiments. Turkish Emotional Word Norms for Arousal, Valence and Discrete Emotion Categories were used for experiment words, images were selected from FACES (Ebner, Riedier, & Lindenberger, 2010). Participants were selected from Çankaya University students who are healthy. For EST-w 32 young adults and for EST-p 41 young adults participated. EST-w had 60 emotion-loaded words. EST-p had 9 different types of stimuli (total 108 stimuli) which were fearful face, angry face, and neutral face (congruent, incongruent). Results supported the evidence of the significant reaction time difference between emotional stimuli and neutral stimuli. In/Congruent anger and in/congruent fear are significantly different from the in/congruent neutral ($p \leq 0.05$).

Keywords: Cognitive Control, Emotion, Emotional Stroop Tasks, Congruent, Incongruent

Presentation type: Oral presentation / Talk

Session: Emotion

Strategic responding in false-recognition tasks and the role of reasoning in memory

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The DRM paradigm is widely used in false recognition research. In the task, participants study lists of thematically related words and often identify unstudied related items as being 'old'; these responses are presumed to reflect basic memory processes. In contrast, we find evidence that people often relied on non-memory/strategic responses, using the knowledge that some studied words were related to motivate an 'old' response for unstudied related words. In Exp 1, our modelling suggested that true memories generated responses that were different from those associated with responses towards unstudied related words. In Exp 2, false recognition increased when participants were

given explicit knowledge of the thematic label for thematically ambiguous study lists. We discuss the natural role of reasoning in memory, and strategies to identify/reduce its influence in false recognition tasks to isolate the pure products of memory.

Keywords: memory, false memory, mathematical modeling, reasoning

Presentation type: Oral presentation / Talk

Session: Computational Approaches to Modeling Cognition

PAIN PROCESSING IS DIFFERENTLY AFFEECTED BY CHRONIC PAIN AND AGING

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Chronic pain in the older population is a growing public health concern. Despite this, no research has analysed electroencephalographical (EEG) correlates of painful and nonpainful stimulation processing in older people with chronic pain. We compared pain-related evoked potentials (PREPs) of 27 pain-free older participants and 24 older adults with musculoskeletal chronic pain (>60 years old), as well as 27 pain-free younger adults (18-25 years old). Participants received 30 trains of painful electrical stimulation to the thenar eminence of the non-dominant hand, individually adjusted to elicit an intensity of four on a 0-10 rating scale. In addition, 30 non-painful stimulus trains were presented. EEG data were analysed using a cluster-based permutation test (CBPT). We found no group differences in sensory and pain thresholds, neither in pain ratings. Both older participant groups showed decreased PREPs compared to young except in late positive potentials (350 to 500 milliseconds), where no differences between younger and older adults with chronic pain were found. Moreover, older participants with chronic pain showed enhanced PREPs from 160 to 500 milliseconds in comparison to healthy older adults. These increased amplitudes in late evoked potentials in the chronic pain group might reflect an augmented alarm/orienting response to pain stimulation. Altogether, our results suggest that plastic changes driven by suffering from long-lasting pain outweigh those resulting from the normal aging process when both coexist. Supported by the Spanish Ministry (PID2019-110096GB-I00/AEI /10.13039/501100011033).

Keywords: Aging, chronic pain, pain perception, electroencephalography.

Presentation type: Oral presentation / Talk

Session: Pain and Aging

The role of response codes in the spatial semantics of numbers (and time).

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Does the semantic representation of number and time magnitudes has an inherent spatial component? Through the discussion of a series of behavioural and EEG studies in healthy participants we shall argue that reliable mental-spatial representation of numbers and temporal magnitudes largely depends on the combined use of spatial and number magnitude or time magnitude codes in the task at hand. This evidence suggests that, in the domain of magnitude estimation, Space-Number, e.g. SNARC effect, or Space-Time interactions, e.g. STEARC effect, are secondary to the primary transfer of spatial response codes to the representation of number or time stimuli and do not derive from a primary congruence, or incongruence, between independent spatial representations of response space and number or time space.

Keywords: Space Number Association, Response Codes, Mental Number Line, Space Time Association

Presentation type: Oral presentation / Talk

Session: How spatial are numbers?

Does the preference for uncertainty communication moderate trustworthiness perceptions of uncertainty communication?

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Communicating uncertainty about scientific insights may either have no, negative, or positive effects on how trustworthy the audience perceives respective communicators (Ratcliff et al., 2022). One explanation for this evidence could be that perceptions of trustworthiness depend on individuals' preferences about whether and what uncertainty they want communicated (see for instance Wegwarth et al., 2020). Ratcliff and colleagues (2018) found that people with a high uncertainty preference perceived a scientist who communicated uncertainty as more trustworthy in contrast to people with a low uncertainty preference. However, they measured a general uncertainty preference that captures individual's attitudes toward science more broadly, although uncertainty is actually multifaceted, both in terms of technical aspects (imprecision, conflict, or lack of evidence; Gustafson et al., 2020) and in terms of its levels (quality of evidence framework GRADE, van der Bles, 2020). Using preliminary online studies, we are developing a measurement instrument that systematically captures preferences in uncertainty communication. We aim to use the developed instrument in a large-scale

mixed-method sample to describe, on the one hand, the general population's differential preferences for uncertainty types and levels and to examine factors that influence these preferences, such as prior knowledge of evidence and uncertainty. On the other hand, we want to investigate whether these preferences are also reflected in trustworthiness perceptions when individuals are actually confronted with presentations of scientific uncertainty aspects and levels.

Keywords: scientific uncertainty, uncertainty communication, uncertainty preference, trustworthiness

Presentation type: No-Data Poster

Session:

Investigating the Mechanisms of Elaboration – What Is Underlying Its Memory Benefit?

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The elaboration benefit on long-term memory (LTM) is well established and widely replicated (e.g., Galli, 2014). Yet, studies investigating the mechanisms underlying the effect are scarce. In two experiments, we tested two opposing hypotheses: (a) Elaboration has been assumed to benefit LTM by leading to meaningful integration of stimuli into existing networks of knowledge, and thereby, establishing potential retrieval cues (richness account, e.g., Craik & Tulving, 1975), and (b) that elaboration makes memory representations distinct from others, thus, facilitating memory search (distinctiveness account, e.g., Gallo et al., 2008). We manipulated combinations of elaborated features in order to create (a) rich and detailed or (b) distinct memory traces. Neither detailed nor distinctly elaborated words were remembered better than words elaborated with only one feature, which can be taken as direct evidence against the distinctiveness account. Although we also do not find evidence supporting the richness account, a slightly modified version of it could accommodate our results: Therein, elaboration benefits LTM retention by activating well-established semantic networks that have the potential to act as strong retrieval cues later on.

Keywords: episodic memory, long-term memory, elaboration, levels of processing

Presentation type: Oral presentation / Talk

Session: Learning and encoding

Close faces are temporally overestimated when distant faces were shown first

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The duration of faces with emotional expressions is usually overestimated compared to neutral ones. This is associated with an increased arousal of emotional stimuli. From research in social interaction it is known that the distance to others affects the evaluation the interpersonal contact. In addition, reduced distance to emotional stimuli was shown to increase their perceived intensity. We assumed that the temporal overestimation of emotional compared to neutral faces is pronounced more when faces are presented close compared to farther away from the observer. To investigate this, participants categorized angry, sad, and neutral faces with varying duration (400, 600, 800, 1000, 1200, 1400, 1600 ms) at a distance of 60 cm and 120 cm from the observer as either short or long. An effect of emotion on duration estimation as reported in the literature did not occur. However, faces presented in close compared to far distance were temporally overestimated, but only when in the testing order far distance was presented first. We discuss the impact of spatial reference effects for estimating durations.

Keywords: time perception, duration estimation, emotion, facial expressions, depth, distance, interpersonal distance

Presentation type: Poster Presentation

Session: Emotion cognition

Gender Stereotypes in Preschoolers' Mental Rotation

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Research suggests that spatial ability plays a significant role in science, technology, mathematics, and engineering (STEM). Crucially, gender differences in favor of males are observable in STEM enrollment and success and spatial cognition. There is ample evidence regarding the influence of stereotyping in this context. Moreover, stereotypes about spatial ability have been demonstrated in children as young as ten years of age. However, there are no scientific studies investigating the presence and potential influence of such stereotypes on spatial ability at even younger ages. The aim of the current study is to illuminate parts of the uncertainty regarding gender stereotypes related to spatial ability in early childhood and their potential relation to mental rotation performance. To this end, approximately 120 five and six year old children (data collection ongoing) will complete an Implicit Association Test, a questionnaire relating to stereotypes about spatial ability, and a chronometric mental rotation task. Additonally, parents will provide information regarding their socioeconomic status (SES). SES will serve as a covariate in this study. We hypothesize that children will hold implicit and explicit gender stereotypes concerning spatial toys and activities, linking them to boys rather than girls. We also expect older children to demonstrate stronger associations in this regard, and boys to demonstrate stronger associations in this regard compared to girls. Lastly, we expect that stereotype endorsement will relate to mental rotation

performance such that a stereotype suggesting greater ability of the own gender will be linked with better performance. This study was preregistered on osf.io.

Keywords: Mental Rotation, Cognitive Development, Stereotypes, Preschool

Presentation type: Poster Presentation

Session: Moral decisions and social interaction

Frequency Regression & Anchoring in Distribution Perception

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In many contexts, informed decisions rely on the correct perception and processing of distributional information. For example, to understand how we and others rank regarding wealth, attractivity or intelligence, we must correctly process how these variables are distributed in others. Despite its importance for decision making, research shows that distribution cognition is often flawed, but the reasons why are not yet completely understood. Our research therefore aims at furthering our knowledge about the underlying processes of distribution cognition. In several laboratory and online studies, we presented subjects with distributions either in the form of numbers or variables like income or age. Values were presented sequentially, and distributions varied along several dimensions, including symmetry, amount of skew, or value range. After the presentation, participants were asked to give different estimations about the distribution, like the lowest numerical value or the mean of the four quarters. Quantitative model fitting via the APE method (Accumulated one-step-ahead Prediction Error) was used to test how accurate different cognitive models were able to predict participants' estimations. Results suggest that Frequency Regression as well as End Point Anchoring have a strong and reliable influence across distributions and settings. These results are of great importance to better understand how people process distributional information, for example regarding economic inequality.

Keywords: Distributions, Numerical-Cognition, Group-Perception, Regression, Inequality, APE

Presentation type: Oral presentation / Talk

Session: Social cognition

Instant Disembodiment of Virtual Body Parts

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Although it seems reasonable to assume that we should be able to distinct clearly what is part of the own body and what is not evidence coming from multisensory body illusions suggests that the body representation is astonishingly malleable. While the embodiment of external objects has been extensively studied in the last twenty years, the disembodiment of previously embodied entities was mostly neglected. The current study investigated the disembodiment of a previously embodied two-dimensional virtual hand that could be controlled by movements of a computer mouse or on a touchpad. To induce embodiment participants were instructed to move the virtual hand back-and-forth. Then we probed for disembodiment by comparing two conditions: participants either continued moving the virtual hand as before (active condition) or they stopped moving and kept the hand still (no-movement condition). We expected a continuously high level of embodiment for the active condition and a gradual disembodiment of the virtual hand in the no-movement condition because the body representation would be continuously updated by incoming correlated visuomotor signals in the former, but no multisensory updating would take place in the latter. In contrast to our hypothesis, participants instantly disembodied the virtual hand right after stopping to move. The results are in line with studies showing the embodiment of controllable virtual or physical external objects and extend them by demonstrating that a previously embodied virtual object becomes instantly disembodied as soon as embodiment of this object is no longer functional for current task performance.

Keywords: body representation, embodiment, disembodiment, moving rubber hand illusion

Presentation type: Poster Presentation

Session: Motor and action control

Fostering General and Smartphone Usage-Related Privacy Awareness through Threat Appeals

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Smartphones and mobile applications have become an integral part of our everyday lives as technology consumers. Adverse incidents in the past, such as data security breaches or subtle data-based manipulations show that an increased privacy awareness is an important feature of a democratic system. Fear appeal research, applied initially to clinical contexts, provides a useful conceptual framework to tackle this attentional gap. The idea of fear/threat appeals directed at changing a person's motivation is thereby transferred to threats that might result from insufficient data protection efforts. We conducted an online experiment among Austrian students (n=81) that aimed at understanding the effect of a short threat appeal intervention (touching the three topics of mass manipulation, social credit systems, and surveillance

capitalism) on both general privacy concerns and more specific mobile users' privacy concerns. Regression and moderation analyses were conducted to test central hypotheses. Within the experimental group, higher vertical – that is institution-related – privacy concerns could be observed. General horizontal or smartphone usage-related privacy concerns were unrelated to the threat appeal intervention. Conspiracy mentality, general trust, and belief in a just world did not moderate the former relationships. The absence of an experimental effect on reported mobile privacy concerns is noteworthy, as it indicates that the experimental subjects might have perceived these issues as unrelated. Future appeals aimed at promoting an elaborate understanding of how privacy risks relate to the mobile sphere clearly need to address the societal and political dimensions of this technology in greater detail.

Keywords: data privacy attitudes, threat appeals, smartphone usage-related privacy concerns

Presentation type: Poster Presentation

Session: New media and machine interaction

Transfer of Approach-Avoidance Training: Motoric or Goal-Related?

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Approach-avoidance training (AAT) procedures were developed with the prospect that they can modify action patterns underlying addiction and other maladaptive behaviors. Research suggested that the outcome of AAT procedures is mediated by training-induced changes in implicit response tendencies. This study investigated whether AAT procedures affect implicit response tendencies because of a training of goal-related responses or due to a training of motoric actions effecting approach and avoidance. Participants in three experiments constantly alternated between AAT tasks and a flanker-like test task that probed for training-induced changes in response tendencies. Results demonstrated a transfer of relations between stimuli and approach- and avoidance related action goals from training to test tasks. In contrast, relations to the motoric acts had no effect on implicit response tendencies. It is concluded that relations to approach- and avoidance related goals, and not to motoric actions, are established with AAT procedures.

Keywords: approach-avoidance training; implicit response bias; motivation;

Presentation type: Oral presentation / Talk

Session: Implicit testing

Is action-effect learning enhanced by turning the effects task-relevant?

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According to ideomotor theory, motor actions are selected by anticipating their effects. In typical “induction experiments” (Elsner & Hommel, 2001) actions are first associated with contingent but task-irrelevant effects during a free-choice learning phase task. The occurrence of action-effect (A-E) learning is later assessed in a test phase with a free-choice or forced-choice task, using the former action effects as response-eliciting stimuli. Much research employs a free-choice learning phase, following Herwig et al. (2007) who argued that A-E learning only occurs in that case. However, these studies often report rather small learning effects. Important for the present purposes, Eder and Dignath (2017) reported more rapid learning of A-E relations when participants were instructed on these relations beforehand, among others in a condition in which an effect had to be produced intentionally. Therefore, we hypothesized that turning the action effects in an induction experiment task-relevant can lead to a more pronounced learning effect. In an experimental group, we employed a forced-choice task during the learning phase that turned the action effects task-relevant. The task consisted of reproducing a tone sequence by pressing certain keys, therefore operationalizing a stimulus-based learning mode. A-E learning in this group was then compared to that of a control group with a standard learning phase. Results (so far) show the expected, more pronounced A-E learning in the experimental compared with the control group, indicating that turning the action effects in the learning phase task-relevant does indeed enhance A-E learning.

Keywords: action-effect learning, ideomotor theory, stimulus-based learning, free-choice, forced-choice

Presentation type: Poster Presentation

Session: Stimulus-response and response-effect binding

Social media and beauty ideals – Expectations of ourselves and others: An analysis using 3D software

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Since it’s rise, social media has repeatedly been associated with negative effects on body ideals. However, the vast majority of these studies focused only on self-perception rather than the perception of others. The aim of this study was to find out which body ideals apply to the perception of one’s own body and the bodies of others, and which differences and similarities can be perceived. In order to narrow the scope of the study, it was limited to male and female subjects. In addition, it was examined whether the use of social media leads to a stricter rating of the attractiveness of others. To investigate

these questions, a combination of questionnaires and software for creating three-dimensional bodies was used. Participants created their own body, the ideal body for their own sex, and the ideal body for the respective other sex. No significant relationships were found between the use of social media and self-esteem, body satisfaction or the tendency for social comparison. Women created significantly thinner and more muscular bodies as the female ideal than for their own current figure. For women only, social media time is significantly related to a thinner body ideal for themselves and leads to a stricter rating of the attractiveness of others. Comparing different body ideals, it can be seen that men built bodies with significantly more muscles as the ideal for themselves than women preferred for an ideal man. Men, preferred women to have a body that is slightly thinner than women prefer for themselves.

Keywords: body image, body ideal, social media, media, software, attractiveness, beauty ideal

Presentation type: Poster Presentation

Session: New media and machine interaction

Neural correlates of decision making in football scenes: Evidence from referees' behaviors

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The relation of athletic expertise and cognitive processes as in judging critical football situations has been extensively studied. “Neural efficiency" suggests that higher expertise is associated with lower (alpha) frequency power in the electroencephalogram (EEG), and these effects have been related to attentional processing. A variety of sport studies investigated neural efficiency using motor tasks. Here, event-related EEG alpha desynchronization (ERD) in addition to behavioural measures is used to investigate neural efficiency in a decision-making task in football refereeing situations. For this purpose, a group of 21 football referees was compared with a group of 21 football players during the judgment of a series of football situations and a resting baseline task. The referees showed better accuracy ($t(40) = 6.07$, $p < .001$, Cohen's $d = 1.874$) and made faster decisions than the players during the decision tasks ($t(40) = -4.27$, $p < .001$, Cohen's $d = -1.318$). In addition, referees showed lower alpha-ERD in the anterior and central brain regions than the control group of players ($t(40) = 3.296$, $p = 0.023$ & $t(40) = 3.210$, $p = 0.029$, respectively). In conclusion, our results suggest a more efficient cortical function in referees compared to players, as evidenced by lower cortical activation (i.e., weaker ERD) during football decisions. The better performance and the reduced alpha ERD in referees suggest a more efficient cognitive processing, involving possibly attentional resources. Therefore, the present data support the neural efficiency hypothesis.

Keywords: Football, Decision-making (DM), Neural efficiency theory, Electroencephalography (EEG), alpha event-related desynchronization (ERD)

Presentation type: Poster Presentation

Session: Moral decisions and social interaction

Distractor Activation in Conflict Tasks is Transient rather than Permanent

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Permanent activation models of conflict tasks assume that the distractor constantly provides input into the response selection process. Consequently, the compatibility effects observed in these tasks should increase at longer RTs, reflected in positive-going delta functions (pDPs), especially for longer stimulus durations However, in a classical Simon task, negative-going delta plot slopes are typically observed, and further, such slopes are unaffected by stimulus duration. This observation is consistent with transient activation models such as the diffusion model for conflict tasks (DMC, Ulrich et al., 2015), which assume a brief and short-lived distractor activation. Since these models describe general cognitive architectures, it is important to test their predictions across various boundary conditions. To that end, we investigated in how far the assumption of a transient rather than permanent distractor activation generalizes across different conflict tasks. Specifically, we compared the effects of short (200 msec) versus response-terminated stimulus duration on the DP slopes in a classic Simon and accessory Simon task (Exp. 1), and in a classic Simon and Eriksen flanker task (Exp. 2). Both experiments revealed that the DP slopes were largely unaffected by stimulus duration. Specifically, the typical nDPs for the classic Simon but pDPs for the Eriksen and accessory Simon task were observed in both stimulus duration conditions. Additional modeling revealed that the parameter of DMC reflecting the time-course of distractor activation varied in accordance with the empirical DP slope pattern. Taken together, we argue that our results suggest a transient rather than permanent distractor activation in conflict tasks.

Keywords: cognitive conflict, Simon, Eriksen, diffusion model, delta plots, selective attention

Presentation type: Oral presentation / Talk

Session: Spatial Compatibility Effects: Old effects, new ideas and a bright future I

Comparing Bayesian hierarchical models of cognition via deep learning

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Bayesian hierarchical modeling is an increasingly popular approach to represent nested data structures that arise frequently in the psychological and cognitive sciences. Bayesian model comparison provides a principled way to select amongst competing hierarchical models but is usually intractable for non-trivial model formulations. In this talk, we introduce our recently proposed deep learning method for comparing arbitrarily complex Bayesian hierarchical models. Our simulation-based approach enables the approximation of Bayes factors or posterior model probabilities regardless of the tractability of a model's likelihood function, thus liberating psychological modelers from a long-standing trade-off between accuracy and computability. Moreover, the amortized nature of our method allows for extensive validation on simulated data and can be leveraged to perform a-priori optimization of experimental designs (e.g. sample size determination). We present a benchmarking of our method against bridge sampling in which we test the methods' ability to discriminate between hierarchical models of cognition. In addition, we demonstrate a comparison of hierarchical evidence accumulation models that would have been infeasible with existing methods.

Keywords: Bayesian inference, deep learning, model comparison, hierarchical modeling, cognitive modeling

Presentation type: Oral presentation / Talk

Session: Advances in data analysis

The effect of item properties on associative memory in young and older adults

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Memory for associations is more vulnerable to aging than other aspects of episodic memory, but the factors that influence the magnitude of this age-related associative deficit remain to be determined. The present study examined how the visual complexity of items to-be-encoded as components of an association affects episodic memory for the association in young and older adults. In experiment 1, young adults encoded object pairs that were presented either as black line drawings (low visual complexity) or as color photographs (high visual complexity). Item, but not associative memory was improved in the high complexity condition. Event-related potentials recorded during item recognition suggested that item complexity reduced bottom-up item recollection, but enhanced top-down reconstruction of the study episode. Experiment 2 revealed that in older adults, both item and associative memory were enhanced in the high complexity condition, suggesting that older adults' associative memory can benefit from detailed, complex item memory traces, presumably allowing for the (re-)construction of rich inter-item associative details. These results may provide the basis for instruction and training methods for older adults, directed at the manner in which item information is encoded, to optimize their associative memory.

Keywords: Episodic Memory, cognitive aging, event-related potentials

Presentation type: Poster Presentation

Session: Memory and working memory

Pressing the light switch for binding: Stimulus-response binding depends on prefrontal cortical activity

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According to action control theories, responding to a stimulus leads to binding of stimulus features and response. Repeating any component retrieves the previous information, leading to benefits for full repetitions but interference for partial repetitions. These partial-repetition costs are typically absent in localization tasks, in which participants signal the location of a stimulus. Yet, it has been shown that binding effects can occur in localization performance, if the location feature is processed in a post-selective step before the response is executed. Additionally, it has been shown, that binding effects are reduced in overlearned tasks. Both effects might be mediated by involvement of prefrontal brain structures in task processing. Thus, previous studies have shown the correlation between anterior dorsolateral prefrontal cortex activity and response-response binding effects. In the current study, participants localized targets systematically repeating or changing their location and/or color. Crucially, participants had to click on a spatially congruent key (direct response), or a key diagonally opposite to the target (translated response). During these tasks, neural activity was measured with functional near-infrared spectroscopy. On a behavioral level, we replicated that binding effects were present in the translated condition but absent in the direct condition. Further, neuronal activation was higher in the translated condition than in the direct condition. Also, higher activity, specifically in the anterior region, correlated with greater binding effects. Our results suggest that localization tasks with an arbitrary response mapping need more cognitive processing capacity to execute an action and for this reason, binding effects materialize.

Keywords: Action control, functional near-infrared spectroscopy, dorsolateral prefrontal cortex, stimulus-response binding

Presentation type: Poster Presentation

Session: Stimulus-response and response-effect binding

Effects of social comparison stimuli on body-size judgment: How are prior sampling distributions utilized and updated from?

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Sampling theories suggest that quantitative judgments are comparison-based and, therefore, fundamentally relative, and susceptible to continuous revision based on information sampled from our environment. Body satisfaction and weight judgment in women are a domain of clinical relevance in this context, as they have been shown to be related to unfavourable social comparisons. To predict sampling-based influences on judgment, not only the central tendency of the comparison sample, but also its variability, need to be considered. Following a simple updating approach, lower variation should lead to longer-lasting effects of bias in prior distributions than higher variation, that is, to assimilation effects. However, judgments may also be influenced by expectancy violations: In a narrow distribution, strong deviations from the mean are rare, and may therefore invite more extreme judgments, that is, produce contrast effects. We investigated whether the distribution of potential social comparison standards in the domain of weight could function as an “experimentally induced prior”. In a continuous sampling task, we presented schematic figures of female bodies which varied systematically in weight. During the first block, participants observed one of six distributions which differed in the means and standard deviations of the stimuli’s body-mass-index. In a second block, stimuli were drawn from the same wide normal distribution with a conventionally midweight mean. In line with expectancy violation, we observed a contrast effect: Body-size judgments were more strongly biased away from the prior distribution if it was narrow than if it was wide.

Keywords: Judgment, Social Comparison, Clinical Psychology, Body Image, Bayesian Cognition

Presentation type: Oral presentation / Talk

Session: The relative self: Social comparison and its implications for cognition, well-being and self-construal

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Divergent but not convergent verbal processing is indicated by upper alpha synchronization beyond WM

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Divergent and convergent thinking tasks provide insight on how humans are operating in open and closed problem spaces. Both have been connected to specific modulations in the EEG alpha band (10-12 Hz). However, these tasks often operate in different knowledge domains (e.g., verbal, spatial-figural) and are based on entirely different task designs (e.g., drawing, verbal, written). At the same time, prior research showed that

both divergent and convergent thinking heavily rely on working memory (WM) capacity of the subject. Therefore, directly comparing both processes might result in an overestimation of their shared variance due to the impact of WM. We used three tasks for divergent and convergent thinking as well as a WM task that target verbal processing by using highly comparable stimulus material. We investigated divergent and convergent thinking at early, intermediate and late stages of each self-paced trial to account for the temporal variability due to the different cognitive stages in the problem-solving process. As a first step, we used theta band oscillatory activity as an indicator of WM-related activity. In a second step, we removed this oscillatory activity from the data collected during divergent and convergent thinking. Our results show a strong upper alpha synchronization during the divergent in contrast to the convergent thinking task, especially for fronto-parietal regions. Our study provides a first attempt to investigate mechanisms of divergent and convergent thinking beyond WM for the verbal knowledge domain.

Keywords: EEG, working memory, problem solving, divergent thinking

Presentation type: Oral presentation / Talk

Session: Working memory

Flood Defence – A social dilemma for the future

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Existing social dilemma paradigms gave us a good understanding of some aspects of human behaviour in specific social situations, however, they are somewhat limited in their ecological validity and applicability. With this in mind, we developed a social dilemma paradigm, called Flood Defence, which simulates not only the individuals' relations to their own group but also their relations to an outside group, as well as the dynamics between the two groups. In the game, two villages (four people each) – blue and red – must work together to protect themselves against the incoming flood, saving just their own or both villages, while they have the option to be greedy with their resources. Across multiple studies, we discovered that (a) high in-game reward for cooperation urges subclinical psychopaths to disregard the between-group conflict – caused by the different house colours – and cooperate with the out-group (N=116), while (b) immediate monetary compensation (which is dependent on the in-game successfulness) makes participants with higher reward-sensitivity in the BAS system opt for the most optimal strategy (N=44). When (c) anonymity was lifted, male participants were prioritizing their own group, even at the expense of in-game success (N=48). We also found that (d) changing the colours of the houses from blue and red to a homogenous grey can significantly increase cooperation with the out-group (N=383). As most aspects of the game can be adjusted/controlled/manipulated, it can be utilized in various research paradigms where intra- and intergroup relations are important to consider.

Keywords: social dilemma, cooperation, dark triad, BIS/BAS

Presentation type: Oral presentation / Talk

Session: Implicit testing

How does beautiful art influence pain and stress experience?

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Art can be a powerful, accessible, cost-effective, and nonpharmacological tool to reduce both pain and stress in everyday life. When it comes to visual art as a tool for pain reduction, findings are mixed: beautiful paintings have the potential to decrease pain perception (de Tommaso et al., 2008) however, Mitchell et al. (2008) did not find that visual art influences pain tolerance or perceived control over pain. Therefore, the question remains whether beautiful visual art can really influence pain and stress experience. Due to the sensory and affective component of pain and stress (Villemure & Bushnell, 2009), as well as the affective and cognitively engaging nature of visual art (Leder et al., 2004; Pelowski et al., 2017), we argue that art can be a beneficial tool in this regard. In our study, we asked people (N=45) to select artworks that they found movingly beautiful and not beautiful—due to the private and personal nature of aesthetic experiences (Leder et al., 2016)—and compared these artworks to a neutral stimulus (a grey screen) in a within-subject design on different days. We investigated whether the aesthetic quality of the artworks has the potential to alter pain and stress perception–induced by a cold pressor test. Our findings are discussed in terms of subjective components of pain, and stress perception, as well as physiological (electrocardiogram, electrodermal activity), and endocrine (salivary alpha-amylase and cortisol) measures.

Keywords: Aesthetic experience, Pleasure, Pain, Stress, Physiology, Endocrine

Presentation type: Oral presentation / Talk

Session: Aesthetics and perception

A Multi-Method-Approach for Investigating Attitude Change of Emerging Technologies

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Emerging technologies will later only be applied if stakeholders, policymakers and/or the broader public accept them. Thus, it is important to understand the process of attitude formation towards emerging technologies to inform possible design decisions of technologies in the early process of development. To investigate the attitude formation towards a fictional technological implant we set up a mixed design (2x3) with a within factor “time” (two measurement time points) and a between factor “condition” (two experimental and one control condition). Within one-week participants draw two times a Cognitive-Affective Map (CAM). CAM is a relative novel quantitative and qualitative research tool, which allows to identify, visually represent and analyze existing belief structures. Within the experimental conditions participants who drew a CAM with positive connotations elaborated a negative CAM and vice versa while participants the control group elaborated their own CAM. Applying multivariate multilevel models, a significant change in attitude was found in the experimental groups. This significant change is further elaborated by means of additional quantitative and qualitative analysis, whereby we summarized the CAM by a recently developed five-step procedure to additionally investigate the attitude change on a content-wise level.

Keywords: Attitude formation, Attitude change, emerging technologies, prospective technology assessment, empirical ethics, Cognitive-Affective Map

Presentation type: Oral presentation / Talk

Session: Attitude formation and decision making

Turning things around: Influence of body position on the simon effect

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Does the body position matter when performing a cognitive task? Previous research using experimental tasks with cognitive conflict such as the Stroop task or task investigating the between-task congruency effect showed contradicting results. When comparing cognitive performance while sitting or standing, some studies reported impairments during standing, whereas others showed cognitive improvement. However, all this research used cognitive conflicts inherent in the stimulus material (e.g. Stroop), but not cognitive conflicts involving the spatial domain. The cognitive conflict in the Simon task or spatial compatibility task used here recruits to the match or mismatch between task-(ir)relevant stimulus position on the screen and response selection. Here, we present the results of two experiments which used a gyroscope to manipulate the body position. Participants performed each experiments in upright and horizontally tilted positions. The talk will focus on the influence of one’s own body position on response conflicts in spatial compatibility tasks.

Keywords: body position, simon effect, compatibility

Presentation type: Oral presentation / Talk

Session: Spatial Compatibility Effects: Old effects, new ideas and a bright future I

Counting habits and processing depth determine attentional SNARC

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Does seeing small vs. large numbers (e.g., 1/2 vs. 8/9) automatically shifts observers' attention into left vs. right hemi-space? We report four experiments (N=162) where centrally presented uninformative numbers were followed by lateralized targets requiring go/no-go detection responses. Observers either distinguished numbers from other symbols, or classified numbers by parity or magnitude. Attention shifts occurred only after magnitude processing and their direction depended on observers' directional preferences for object counting. These results clarify when numbers activate their inherent spatial associations and lead to spatial attention shifts.

Keywords: attention shift, conceptual cueing, spatial-numerical associations, numerical cognition.

Presentation type: Oral presentation / Talk

Session: How spatial are numbers?

The relationship between sport expertise and response inhibition

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Athletes in interactive sports have to make decisions quickly and initiate appropriate movements, which may have to be stopped due a changed game situation. Whether and how quickly already initiated movements can still be inhibited is an important criterium in elite sports. While studies indicate that elite athletes are better in response inhibition performance (RIP) compared to recreational athletes, the question of whether RIP also differentiates between elite athletes has not been answered. Therefore, the aim of the study was to investigate the relationship between expertise level and RIP. 92 elite athletes completed a PC-based response inhibition task ("stop-signal paradigm"; Verbruggen & Logan, 2008) with hands and feet. In addition, an expertise score (Swann et al., 2015) was determined for each athlete. Multiple linear regression was used to calculate the relationship between expertise and RIP ("stop-signal-reaction-time" (SSRT)). Multiple linear regression results show a significant relationship between expertise and SSRT ($F(2,89) = 4.87$, $p = .01$, $R2 = .09$) with a significant influence of the hands ($b = -.24$, $t = -2.1$, $p = .03$).The results show that a differentiation in terms of RIP is possible even between elite athletes. However, whether expertise affects RIP or

vice versa cannot be answered at present. Verbruggen, F., & Logan, G. D. (2008). Response inhibition in the stop-signal paradigm. Trends in Cognitive Sciences, 12, 11, 418–424. Swann, C., Moran, A., & Pigott, D. (2015). Defining elite athletes: Issues in the study of expert performance in sport psychology. Psychology Sport and Exercise, 16, 1, 3-14.

Keywords: elite athletes, SSRT, sports games

Presentation type: Oral presentation / Talk

Session: Perception and Action in Sports

Emotional reactivity of rescue workers: a study of habituation and emotion regulation processes while processing of emotional stimuli

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Rescue workers are often confronted with situations that can elicit strong emotions. To remain capable of acting in emergency situations and to maintain mental health in the long term, high self-regulatory demands are placed on rescue workers. Research shows that rescue workers particularly rate disgust and sadness stimuli in valence as less unpleasant compared to individuals who are not continuously confronted with emergency situations (Völker & Flohr-Devaud, 2021). However, it remains open, which fundamental processes lie behind this reduced emotional reactivity and to what extent the findings can be transferred to the dimensions of potency and activation. In the present study, the emotional reactivity of rescue workers (n = 65) was examined on the dimensions of valence, potency, and activation and compared to a comparison sample (n = 65) without medical experience. Special attention was paid to habituation and emotion regulation processes. For this, responses to repeatedly subliminally presented images that normatively elicit disgust, sadness, and fear were compared with responses to previously unpresented images in two emotion regulation conditions. Compared to the control group, rescue workers reacted less intensely to disgust and sadness stimuli and habituated more strongly to these stimuli. Emotion regulation and habituation proved to be two functionally independent processes. Thus, the reduced emotional response of rescue workers can be attributed to habituation processes. Although habituation is often described as a non-associative process, the repeated categorization of similar stimuli seems to play a central role.

Keywords: rescue workers, emotional reactivity, habituation, emotion regulation, subliminal presentation, emotional stimuli

Presentation type: Oral presentation / Talk

Session: Emotion

The structure of bindings for action slips

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Even if actions go awry, they prompt eligible short-cuts for action control: Acted-upon stimuli are bound to actual but not executed correct responses and executed erroneous responses enter bindings with effects that they produced. The subsequent repetition of these stimuli or effects then triggers the retrieval of any bound responses facilitating their execution. As such, binding and retrieval steer agents toward successful actions while also leveraging potential action-effect contingencies. The current study scrutinized the structure of these bindings. Features of erroneous action episodes might be organized in independent bindings, i.e., between features of the stimulus and of the intended correct response on the one hand and between features of the executed erroneous response and of its effect on the other hand. Alternatively, stimulus, response and effects features might all be integrated in a unitary event file. We examined performance in a sequential design as a function of transitions in relevant stimuli, responses and effects between successive action episodes to elucidate the structure of bindings for action slips.

Keywords: action control, error processing, binding and retrieval

Presentation type: Poster Presentation

Session: Stimulus-response and response-effect binding

Previous and current action targets held in working memory determine repulsive and attractive serial dependence

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Serial dependence refers to a phenomenon where a current representation is biased by a previous representation. Current representations can be biased either in an attractive or a repulsive manner, i.e., they are inaccurately reported to be more similar or dissimilar to the previous representation, respectively. Here we tested whether the status of a representation as a previous or a potential future target for an action determines the occurrence of attractive or repulsive serial dependence. Participants had to memorize orientations of two gratings. One of them was cued for later report, i.e., it was further maintained as a potential target in working memory. The uncued stimulus could either be removed from working memory immediately or serve as a target for a secondary task before its removal. Subsequently, participants had to memorize the orientation of a third grating. When subjects were asked to report the third orientation, it was repulsed only

by the previously encoded orientation that was still maintained as a potential target in working memory. At the same time, the third orientation was attracted towards the just removed orientation, but only if it had served as a target for the secondary task. These results support previous claims that repulsion serves as a mechanism to separate representations that are concurrently maintained in working memory, whereas attraction supports the integration of past and current representations. Our results additionally reveal that separation and integration operate only between representations that serve or have served as targets for an action.

Keywords: Working Memory, Serial Dependence, Visual Bias

Presentation type: Poster Presentation

Session: Memory and working memory

Flexible, goal-relevant usage of emotion information: The role of contingency awareness in endogenous cueing

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Emotional facial expressions do not only trigger processes that are intrinsically related to their emotional meaning, but their emotional information can be used to initiate flexible, goal-directed processes. Specifically, emotional expressions can serve as informative cues in endogenous cueing, efficiently directing attention to a target location (Folyi, Rohr, & Wentura, 2020). In this task, we used emotional faces as central cues, while the emotional expression of the face signaled with p=.80 the lateral location of upcoming targets. Cueing effect emerged fast, based on specific emotions, and even masked presented emotional faces could be utilized to control anticipatory attention. The present talk targets the underlying mechanism of this effect. In two experiments, we tested whether cueing effect emerges based on (a) explicit prior knowledge (or recognition) of cue-target contingencies; or (b) implicit learning of these contingencies. First, cue emotion was again predictive to the target location, but critically, participants did not receive any information about this relationship. Majority of the participants could not report the contingencies, and there was no indication of cueing. In a second experiment, we tested if reliable cueing effects emerge if cues are not predictive, thus, solely based on the instructions to use the emotional information for spatial orienting. Significant cueing effects emerged, suggesting that explicit instructions even without cue-target contingencies can play a critical role. Overall, our results indicate that participants can “tune” their attentional system voluntarily to use the context-bound meaning of emotional faces with remarkable efficiency, while implicit probability learning does not explain the effect.

Keywords: emotional facial expressions, attention, spatial cueing

Presentation type: Oral presentation / Talk

Session: Emotional faces in social cognition: New approaches and recent insights

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Replication of the Chameleon Effect (Chartrand & Bargh, 1999, Study 1)

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In 1999, Chartrand and Bargh first demonstrated that humans have a natural tendency to mimic one another. The Chameleon Effect, named after this phenomenon, refers to “nonconscious mimicry of the postures, mannerisms, facial expressions, and other behaviors of one's interaction partners, such that one's behavior passively and unintentionally changes to match that of others in one's current social environment” (Chartrand & Bargh, 1999, p. 893). Since then, a lot of research has been conducted in the field of automatic mimicry (e.g., Lakin & Chartrand, 2003; Lakin et al, 2003; Mühlberger et al, 2015, Hogeveen et al, 2015; Kot & Kulesza, 2016). In Study 1 of the original paper, mimicry occurred even among strangers without an active goal to affiliate with the interaction partner. We are currently attempting to replicate Chartrand and Bargh’s Study 1. The experiment is pre-registered via the open science framework (https://osf.io/7weum) and data collection has begun on 28 November 2022.

Keywords: chameleon effect, perception-behavior link, replication, social psychology

Presentation type: Oral presentation / Talk

Session: Replicability

The search for meaning: How real words and non-words as distractors can influence binding effects

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Stimulus-response-binding effects are a central phenomenon in research concerning action control. Current models assume that upon responding to a stimulus, stimulus features, responses, and effects are collectively stored in a short episodic memory trace and upon repetition of any feature retrieved. This even includes the binding and retrieval of distractors, leading to so-called distractor-response-binding effects. The current experiment investigated how semantic stimuli as distractors, specifically real words and non-words, differently affect distractor-response-binding effects. In a prime-probe design, participants responded to the color of semantic stimuli while the identity of those stimuli was irrelevant to the task. Semantic stimuli could repeat or change from prime to probe; additionally, they were either real words or non-words. Results showed a

significantly larger binding effect for words than for non-words in reaction times. These results suggest that, even as distractors, real words are processed differently from non-words. This is discussed in the context of their semantic meaning and the associations connected with it, making real words more relevant than non-words to the cognitive system.

Keywords: action control, distractor-response-binding, semantic information, distractor processing

Presentation type: Poster Presentation

Session: Stimulus-response and response-effect binding

The influence of trust on retrieval of observationally acquired stimulus-response bindings

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Previous studies showed that observationally acquired stimulus-response (SR) binding and retrieval effects only occur when the observed person is socially relevant. This can, for example, result from task demands (e.g. cooperation or competition, Giesen et al., 2014) or the relationship between the interacting people (Giesen et al., 2018). An essential component of successful social relationships, which could therefore also increase the social relevance of another person, is trust (Lewis & Weigert, 1985). In the present study we investigate whether trusting vs. mistrusting the person one is interacting with modulates observationally acquired SR binding and retrieval effects. Trust was manipulated by a variation of the Investment Game (Berg et al., 1995). Interaction partners behaved either trustworthy or untrustworthy by keeping vs. violating a previous promise. After that, participants performed an online interactive color classification task to assess observationally acquired SR retrieval effects. Experiment 1 showed no modulation of these effects by the level of trust. A possible reason for these results is that many participants indicated that they did not believe to be interacting with another human. After their exclusion, descriptively smaller effects were found in the low trust condition, suggesting that retrieval breaks down for untrustworthy interaction partners. However, this was not statistically significant. In Experiment 2, modifications have been made to make the online interactions appear more realistic. Currently, data is being collected for this modified version. Results will be presented and discussed.

Keywords: stimulus-response binding, event files, observational learning, trust, online interactions

Presentation type: Poster Presentation

Session: Stimulus-response and response-effect binding

Metacognitive effects of attitudinal (in)congruence on social media: Relating processing fluency, subjective knowledge, and political participation

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The reception of attitudinal incongruent political information can lead to a reduced willingness for political participation (i.e., behaviors aiming to influence politics). We adopted a metacognitive approach to explain this effect and expected attitudinal (in)congruence to affect the participants' perceived ease of processing (processing fluency) and self-perception of their issue knowledge (subjective knowledge). Subjective knowledge was repeatedly shown to relate to behavioral outcomes, including political participation, and therefore could explain the attitudinal congruence – participation link. Processing fluency might account for the effect of congruence on subjective knowledge. In our pre-registered online experiment, participants (N = 1.285) saw a political social media post on a political topic (speed limit on German highways vs. extension of the service life of German nuclear power plants). These comments either matched (congruent condition) or contradicted (incongruent condition) the participants' personal opinions. In accordance with our hypotheses, we found processing fluency, subjective knowledge, and behavioral intentions to be higher in the congruent vs. the incongruent condition (all p-values < .001, $d_{ProcessingFluency}$ = 0.21, $d_{SubjectiveKnowledge}$ = 0.22, $d_{PoliticalParticipation}$ = 0.23). Further, and supporting our remaining hypotheses, we found a positive relationship between processing fluency and subjective knowledge (???? = 0.11, p < .001) as well as between subjective knowledge and behavioral intentions (???? = 0.43, p < .001). Altogether, these findings highlight the importance of considering metacognitive constructs like subjective knowledge to explain political behaviors and suggest that attitudinal congruence might influence the way we perceive our own knowledge and information processing.

Keywords: subjective knowledge, attitudinal congruence, metacognition, political participation, processing fluency

Presentation type: Poster Presentation

Session: New media and machine interaction

No brain, no problem: Phototactic assay and aneural learning in the slime mold *Physarum polycephalum*

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While cognition was long thought to be an exclusive property of nervous systems, in recent years research has unearthed memory and learning in various aneural and even single celled organisms. This allows for comparative studies to find universal traits of

cognition, differentiate them from those that originate from a nervous system and find the evolutionary roots of learning in neurons. In this regard, slime molds are an interesting model as complex amoeboid organisms with a transition from a single-celled stage to a complex plasmodial stage. Here, we investigate memory and induced behavioral change in the slime mold *Physarum polycephalum*, an interesting model for both its complex behavior und memristive abilities. Despite their lack of specialized anatomy as a macroscopic amoeboid cell, they are known to habituate to aversive stimuli and change their decision making processes, although the mechanisms behind this behavioral change are still unknown. In this study, we examined associative learning in slime molds to investigate their learning capabilities. First, we examined their reaction to various wavelengths of light, finding positive phototaxis for red light and negative phototaxis for blue light. Then, using oat flakes and valerian as positive reinforcement during training sessions, we were able to change their phototactic behavior over time, both showing negative phototaxis to red light as well as positive phototaxis to weak blue light, both of which would fade over time without further reinforcement. This shows the capability for flexible behavioral change and memory in a single-celled organism.

Keywords: Basal Cognition, Aneural Cognition, Physarum, Comparative Psychology

Presentation type: Oral presentation / Talk

Session: Learning and models

Sense of agency in digital media usage: The interplay of decisional control, action outcome valence and locus of control

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Sense of agency (SoA) refers to humans' perception of exerting control over actions and the environment. Although SoA is known to guide human behavior in various domains of daily life, little research so far has addressed the interplay of influencing factors. By the example of digital media usage, this online study aims to investigate the impact of action control (e.g., decisional control), motivational factors (e.g., outcome valence), and traits (e.g., locus of control) on SoA and emotional experience. For this purpose, 99 subjects read an adventure fiction including critical scenarios forcing them to select single courses of action from two possible alternatives. Using a 2x2 mixed design, we manipulated decisional control (between-subjects: low vs. high) and the valence of the predetermined action outcome (within-subjects: positive vs. negative), and recorded participants' SoA and emotional experience (i.e., competence, frustration, enjoyment). After controlling for locus of control, MANCOVA results revealed a significant interaction of the independent variables on SoA (η_p^2= .05) indicating stronger influences of negative outcomes under low decisional control. Generally, greater

decisional control benefited SoA (η_p^2 = .12), though, did not significantly impact emotional experience. Although MANOVA suggested outcome valence to determine both SoA and emotional experience, when adjusted for locus of control, only frustration differed significantly (η_p^2 = .13) for the two outcome valences with failure inducing higher frustration. These findings demonstrate the relevance of decisional control for maintaining SoA and highlight traits as important determinants for individual emotional responses to action outcomes.

Keywords: sense of agency, decisional control, action outcome, emotional experience, locus of control, digital media

Presentation type: Oral presentation / Talk

Session: Embodiment and perspective taking

Processing target-distractor conflict after a switch of the stimulus-response mapping: Manipulation of mapping familiarity and pre-switch conflict frequency

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Switching the stimulus-response (S-R) mapping after practice incurs a reaction time cost assumed to reflect difficulty of overcoming previously acquired S-R associations. These associations may be stronger if acquired while experiencing target-distractor conflict due to increased Hebbian learning. Switching the S-R mapping is also thought to enhance conflict and performance monitoring. We pursued these issues using a temporal flanker task with visually presented letters as stimuli, switching the S-R mapping after a practice phase during which the frequency of conflict trials was manipulated. To explore the role of familiarity of the S-R mapping, participants either first practiced a familiar mapping (i.e., ABCD, from left to right) and switched to an unfamiliar one (i.e., BADC) or vice versa. To avoid confounds of sequences of congruency levels with repetitions of stimulus/response features and with distractor-related contingencies, letters were grouped into pairs such that trials requiring left-hand (right-hand) responses featured only A and B (C and D) as targets and distractors. Performance was better with the familiar S-R mapping, outweighing mapping switch costs when switching from BADC to ABCD. During the practice phase, conflict effects were lower when conflict was more frequent (i.e., Proportion Congruency Effect). By contrast, we found no simple differences concerning the congruency effect or the trial-to-trial modulation thereof (i.e. Congruency Sequence Effect) as a function of mapping familiarity or of (pre-switch) conflict frequency, after the mapping switch. Our results do not provide much support for conflict-related strengthening of S-R associations and enhanced monitoring after an S-R mapping rule switch.

Keywords: stimulus-response mapping reversal, congruency sequence effect, proportion congruency effect, temporal flanker task

Presentation type: Poster Presentation

Session: Cognitive flexibility

Representational momentum in Abstract cognition: An Integrative Review

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This literature review assesses the neglected role of invariant representations in grounded cognition approaches. Invariant representations consist of physical invariants (e.g., momentum, gravity, friction) which are internalized and form part of the mental representations of objects. Other features of objects, such as their appearance, tactile feel, or taste are represented in the form of sensorimotor states. In grounded cognition approaches, abstract concepts, which by definition cannot be perceived using the sensorimotor system, nonetheless consist of sensorimotor representations. Following this, invariant representations should also be material in which to ground abstract concepts. The warmth felt when touching a hot cup of coffee is part of the object representation just like the gravity acting upon it when it falls off the table. With grounded cognition becoming a staple of cognitive research, and recent advances in research on invariant representations, this review addresses an overdue question: What is the role of invariant representations in grounding cognition? Most grounded cognition theories include only body-related, sensorimotor experiences. Others (e.g., conceptual metaphor theory) implicitly include invariant representations. Some do not deny, but also do not explicitly mention them (e.g., perceptual symbol systems). Only very few theories mention invariant representations, then as shaping cognition (e.g., the TEST taxonomy), or as an organizing principle of cognition (e.g., Shepard's ecological constraints). We present a theoretically-unbound summary of literature, describing that the neglect of invariant representations may be unjustified, and we delineate hypotheses addressing critical questions for future progress in this domain.

Keywords: embodied cognition, grounded cognition, representational momentum, concepts, abstract, representation, modal

Presentation type: Oral presentation / Talk

Session: Embodiment and perspective taking

Good Vibrations: Modality Influences on Reactive Inhibition in the Stop-Signal Paradigm

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Stopping an already initiated response is vital for adaptive everyday behavior. For example, every athlete knows the feeling that a just initiated action is wrong or leads to a disadvantage. A table tennis player might notice – while actually returning a serve – that the serve went out wide. In the laboratory, the ability to inhibit already initiated responses can be measured using tasks such as the Stop-Signal Task (SST), which typically requires reaction to a visual go-signal and the subsequent stopping of a reaction on a small subset of trials. What remains unclear is whether or not the modality of the stop-signal has any influence of the performance. We hypothesized that the tactile stop-signal condition would have a performance advantage in an otherwise visual task. In multiple experiments we evaluate the effects of a cross-modal stop-signal and the results show a significant performance advantage of tactile stop-signals as compared to visual ones in an otherwise purely visual task. Further, we investigate the potential over-additive effect of stop-signals that cover multiple modalities. Yet, the influence of modality on SST performance in complex environments remains even less clear and it could be assumed that distracting stimuli only affect stopping performance if they are presented in the same modality as the stop-and go-signal. But if distractors are only presented in the modality of the go-signal it might have no effect at all or only effect the go-reactions.

Keywords: Inhibition, Stop-Signal Task, Cross-Modal, Multisensory, Cognitive Control

Presentation type: Oral presentation / Talk

Session: Applied attention

General Discussion – What is ‘free’ in free choice task and is this the right kind of free?

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Free choice tasks are routinely used in some research contexts. They have relatively clear defining traits by which they can be identified and at least some of their interactions with other psychological paradigms are known. That said, most of these definitions and empirical observations are of an operational nature rather than a conceptual one. The purpose of this talk is to provide a framework for discussion about important, but often neglected questions like: What does the freedom in free choice tasks mean? What *can* it mean? What would we like it to mean? If there is a gap between what we want to learn and what we can learn, and can it possibly be closed? How? Are there feasible alternatives suited for experiments mostly performed in the lab or in online labs? As a

starting point for discussion, a short presentation gives a selective overview of existing definitions of what constituted a free choice task and considers potential answers to the questions raised above. Afterwards, the attendees of the symposium and the audience are invited to share their perspectives in the context of a moderated discussion.

Keywords: free-choice

Presentation type: Oral presentation / Talk

Session: Current directions in free-choice paradigms II: What we can learn from giving more control to the participant

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The influence of free choice on recognition memory

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Several studies demonstrated a benefit in recognition memory for items learned under free-choice conditions compared to forced-choice conditions. In these studies, to-be-remembered items were presented in isolation, but in many everyday situations learning material is presented in a context with many distractions. In the present study, we tested in two experiments the influence of free vs. forced choice on recognition memory in a learning situation with relevant (to-be-remembered) items presented together with irrelevant (to-be-ignored) items. Experiment 1 (N = 62) used compound word-picture stimuli and Experiment 2 (N = 59) a combination of written and spoken words. Prior to the presentation of the two stimuli, participants were either instructed which item to remember (forced choice) or could decide themselves (free choice). Receiver operating curves for both experiments were estimated based on the unequal variances signal detection model of recognition memory. Results showed a strong superiority effect for pictures (Experiment 1) and recognition memory was better for relevant items than irrelevant items. Free choice further boosted recognition memory with preliminary evidence for a more pronounced benefit specifically in relevant items. That is, participants were able to selectively learn in the face of irrelevant distractions and having some control about the learning situation seemed to further improve memory specifically for relevant items. Applied to everyday learning, this suggests that self-directed learning is beneficial even in situations with irrelevant distraction.

Keywords: recognition memory, free choice, signal detection theory

Presentation type: Oral presentation / Talk

Session: Current directions in free-choice paradigms II: What we can learn from giving more control to the participant

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COVID-19 Vaccine Hesitancy: A Process-Tracing and Computational Modeling Analysis

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Results from large-scale surveys indicate that a key reason underlying COVID-19 vaccine refusal are concerns regarding the side effects and the benefits of the vaccines. However, the cognitive mechanisms related to vaccine refusal are unknown. Since the choice to get vaccinated is a risky one (vaccination outcomes are probabilistic), it can be understood through the lenses of cognitive theories of risky decision-making. Here, we examine to what extent vaccine refusal is related to probability neglect – a tendency to ignore probabilities of highly aversive outcomes, such as extreme side effects (e.g., blood clots). In an online study, we contrasted the behavior of three participant groups with different COVID-19 vaccination attitudes: Anti-vaccine (n = 365), Neutral (n = 373), or Pro-vaccine (n = 462). Each participant made a series of hypothetical accept-reject choices about eight existing COVID-19 vaccines. For each vaccine, we presented real data on possible side effects and benefits using the process-tracing methodology Mouselab, which allowed us to monitor predecisional information search. First, we observed that among participants in the Neutral and Pro-vaccine groups and for vaccines with rare and extreme side effects, vaccine rejection was higher than in trials without probability neglect. Second, using computational modeling, we show that the prevalence of vaccine refusal in the Anti-vaccine group is linked to extreme, negative emotional evaluations of the vaccines' side effects and overall neglect of probabilities. These results suggest a need for individualized interventions aiming to increase vaccination uptake.

Keywords: risky choice; vaccine hesitancy; probability neglect; covid-19; process tracing

Presentation type: Oral presentation / Talk

Session: Public health and disorders

A brief history of language in cognition – what do we know?

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In the present symposium we collected research on the effects of language (i.e., instructed or habitual verbal utterances) on cognitive processing such as following instructions, coding responses, object perception and categorization next to revisiting the link between language and intelligence as well as experiments considering accompanying phonological co-activation. The first talk will give a brief overview of the history of language in cognition as well as re-consider the number of stimulus-response episodes for the observation of beneficial effects of evaluative and motivational inner speech. Former research showed reduced interference from incongruent (i.e., mismatch between instructed response and stimulus location) trials when engaging in

habitual inner speech. To rule out simple stimulus-response learning as being causal for this observation to be observed, we used a Simon task with a larger stimulus set embedded in a classification task. Stimuli consisted of vertically or horizontally oriented gratings that were presented either left or right or below and above a fixation cross. In analysing the data, we tested whether those nested congruency effects (i.e., judging a grid as vertically oriented when being in the condition where stimuli are presented below or above the fixation cross) are equally affected by increased engagement in habitual inner speech as formerly reported. Those results will help us to further understand the effects of evaluative and motivational inner speech for basic cognitive tasks.

Keywords: attention, Simon, inner speech, congruency effect

Presentation type: Oral presentation / Talk

Session: Tell me and talk to me – the influence of language on goal-directed performance

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Associative and categorical priming effects in the word-picture paradigm: Hierarchical diffusion modeling analyses

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Sequential priming tasks frequently use word-word pairs as stimuli, but cross-modality stimuli might modulate priming effects and mechanisms underlying these effects. We focus on the word-picture paradigm, because linguistic information is one of top-down factors that influence people's visual perception. The aim of the study is to investigate whether prime words either associated or categorically related with target pictures can lead to faster response times compared to neutral primes. More importantly, hierarchical diffusion model analysis is helpful to disentangle the mechanisms underlying these priming effects. In the experiment, we manipulated the semantic relationships (i.e., association relatedness and category coordinate) between prime words and target pictures in a semantic categorization task. Both associative and categorical priming effects were found in response time. The hierarchical diffusion modeling analysis showed that the associative priming mapped on drift rates, which suggests a spreading activation mechanism like word-word paradigm. The categorical priming was interpreted by the bias at the starting point, which suggests that semantic information generate the prior bias at the decision-making process. The results indicate that there are more complicated processes underlying word-picture priming than word-word priming.

Keywords: priming, cross-modal, word, picture, semantic relationships, diffusion model

Presentation type: Oral presentation / Talk

Session: Cognitive modelling

Lag 6 dual-tasking partial repetition costs show across-task integration after single-task learning

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Past work has documented that the detrimental effect of dual-tasking on learning a repeating sequence of stimulus positions and responses in the Serial Reaction Time Task (SRTT) is due to lack of separation of representations: Participants encode information about the stimuli and responses of the two tasks in joint memory episodes. Therefore, when a task with random stimulus order is paired with the SRTT, encoded compounds contain randomness as well. In the current work we explore whether across-task integration in dual-tasking can be avoided by learning a sequence beforehand in single-tasking. Participants (N=39) reacted to a repeating fixed sequence of six stimulus positions throughout the experiment. In Blocks 1 to 3 (single-tasking) they learned the sequence. This was shown by the RT advantage compared to a control group with random stimulus order (N=41). In Blocks 4 to 6 (dual-tasking) a randomly located stimulus was additionally present in each trial. RTs showed that sequence knowledge could now no longer be accessed. Furthermore, across-task integration was evident no matter whether or not a fixed sequence had been learned before dual-tasking: RTs for trials in which the random stimulus by chance was the same as 6 trials ago (last loop of the sequence) were shorter compared to alternation trials.

Keywords: sequence learning, dual-tasking, Serial Reaction Time Task, partial repetition costs, instance theory, binding effects

Presentation type: Poster Presentation

Session: Cognitive flexibility

Forgetting Fixation: Selective Retrieval in Creative Problem Solving

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Ludwigsburg University of Education

A common issue in creative problem solving is the unwanted fixation on highly associated, but incorrect solutions. In two experiments, we investigated whether retrieval-induced forgetting of previously activated fixation words can mitigate their negative impact on subsequent performance in a Compound Remote Associate (CRA) test. In the beginning of each trial, participants memorized a list containing both neutral words as well as words misleadingly associated with CRA problems that had to be solved later on. Half of the participants then selectively retrieved only the neutral words in a cued recall test, which was supposed to induce forgetting of the non-retrieved fixation words. In both experiments, this mitigated the typical detrimental effect of induced fixation during early problem-solving stages. Additional results showed that

participants who had engaged in prior selective retrieval reported a higher amount of immediate access to solutions of fixated problems as compared to a control group in which fixation remained activated. Thus, temporarily forgetting induced fixation by means of prior selective retrieval seems to enable a short initial focus that may be crucial for fast attempts of problem solving. On a conceptual level, these findings support the assumption of inhibitory processes being involved in both selective retrieval and creative problem solving.

Keywords: selective memory retrieval, retrieval-induced forgetting, fixation, creative problem solving

Presentation type: Poster Presentation

Session: Memory and working memory

Binding Interactions in Working Memory

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Binding accounts propose that whenever we want to execute an action, we must first bind all task-relevant percepts and motor programs together to derive a working action plan. These bindings outlast action execution and can influence subsequent actions, leading to so-called binding effects. Thus, if preexisting bindings and a newly generated action plan coincide, action performance benefits are observed. However, if preexisting bindings and a newly generated action plan do not coincide, because features only partially overlap, performance costs are observed. So far, laboratory studies have focused on binding effects resulting from a single preceding action episode. However, natural behavior is almost always composed of a string of action episodes, all of which in theory generate bindings. Because bindings are stored in limited working memory space, multiple active bindings should interfere with one another. However, in what manner, is so far unclear. Concretely, binding competition might depend on the quality of the bound elements, or it might be independent of the quality of the bound items. We employed a response-response binding paradigm with a prime-intervening-trial-probe design to investigate residual binding effects in a probe, after an additional intervening action pair that was either a full change or a partial repetition from the prime. While we found that intervening-trials in general reduced binding effects in the probe, the type of intervening-trial did not substantially influence probe binding effects. This is clear evidence for content independent interference between bindings that most likely results from an overall limit in working memory capacity.

Keywords: Action Control, Binding, Working Memory, Competition

Presentation type: Oral presentation / Talk

Session: Recent advances in binding and retrieval in action control II: Discarded action plans, event segmentation, and boundaries

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Temporal Neural Mechanistic and Developmental Aspects of the Theory of Event Segmentation

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Humans are exposed to the environment in a continuous flow of experiences, and the brain naturally divides these experiences into discrete parts in order to interpret and organize them. A model for such a partitioning process has been specialized in Event Segmentation Theory (EST) (Zacks et al., 2009, J. Exp. Psychol., https://doi.org/10.1037/a0015305). Despite the number of studies on this topic, the electrophysiological brain mechanisms that underpin this segmentation process and how it changes during years of maturation, which can be tracked using high temporal resolution technologies such as EEG, are still poorly understood. In the work presented, healthy adults and adolescents performed an event segmentation paradigm, i.e., they watched a narrative video and were asked to divide it into meaningful segments while EEG was recorded. The findings show the relevance to event segmentation of oscillatory activity in various frequency bands originating in different brain areas along with their interrelations by utilizing EEG analysis methodologies such as beamforming approaches. The research reveals a mechanistic chain of different cognitive processes that explains how the brain partitions and structures natural scenes while integrating current models of the situation, perception, and previous experience, as well as how these elements may be influenced by developmental factors.

Keywords: Event segmentation theory, development, adolescents, oscillations, EEG

Presentation type: Poster Presentation

Session: Motor and action control

Observational stimulus-response bindings as the cognitive basis of social learning

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Social learning theory (SLT, Bandura, 1986) gives a sound analysis of the macro processes that contribute to observational learning. By doing so, it provides insight into understanding why observers do or do not mimic actions that were previously observed in a model. What SLT does not explain, however, is how these processes are implemented at the cognitive level. This shortcoming is remedied by recent advances from cognitive psychology: The Binding and Retrieval in Action Control (BRAC) framework (Frings et al., 2020) gives a precise analysis of the cognitive micro processes at the heart of action control. However, what is missing from BRAC is a bridge that

connects micro to macro processes. In this talk, I will present an integrated approach that attempts to make this connection by grounding social learning theory in cognitive principles of action regulation. To support this theoretical advance, I will present findings from seven empirical studies. These studies demonstrate close parallels between observationally acquired stimulus-response bindings and social learning from observation. Tentatively, the presented findings indicate that observational stimulus-response bindings might serve as the cognitive basis of social learning.

Keywords: social learning, observational learning, episodic retrieval, stimulus-response binding, event files, social modulations

Presentation type: Oral presentation / Talk

Session: Cognitive building blocks in social contexts

Improving Ecodriving in an Electric Vehicle Driving Simulator: The Role of Energy Dynamics Awareness

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Energy-efficient driving (ecodriving) in electric vehicles is a crucial skill to reduce mobility costs, range stress, and the ecological footprint of electric vehicles. Due to the non-visibility of energy itself, as well as the volatility of energy transformations, it is a demanding task for drivers to 1) judge which actions or situations are energy efficient and 2) to decide on optimal actions. Therefore, understanding psychological states and cognitive mechanisms that enable drivers to drive energy-efficiently is important to guide the design of future human-car interactions (e.g., via ecodriving displays) and support humans in reducing the resources used for mobility. To this end, we developed the concept of Energy Dynamics Awareness (EDA) and a corresponding short scale. We refer to EDA as energy specific awareness about a situation and possible actions therein, comparable to situation awareness. The present driving simulator experiment investigates drivers' EDA, its development over time, and correlations to ecodriving performance. In a mixed-design experiment, participants were tasked with driving eight times on two routes, with the goal of reducing energy consumption and arriving at a fixed destination on time. To manipulate EDA, we varied the demands needed to acquire information about energy dynamics by displaying either one of two instantaneous consumption display variants or a control group with no display. Ecodriving performance and subjective experience were measured. Additionally, eye tracking and qualitative data was obtained. The results are discussed regarding methodological and theoretical implications. We discuss the role of EDA in guiding energy-efficient decisions and actions while driving.

Keywords: Ecodriving, energy, displays, electric vehicles, driving simulation, situation awareness

Presentation type: Oral presentation / Talk

Session: Experimental Engineering Psychology

An Art-Specific State of Mind? Immoral Behaviour is Evaluated Less Negatively in The Context of Art

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Why is it that when we encounter a urinal in a museum space we stop, explore its aesthetic features, think about its meaning, get upset, surprised or excited, and when we see a urinal in the nearby toilets we approach it as a utilitarian object, rarely if ever wonder about its shape, colour or meaning? Philosophers have long debated whether people enter a specific state of mind when they experience art, which makes them view even everyday objects through a different lens. Previous research has shown that people accept more negative emotions, which in everyday life they tend to avoid, in the context of art, thus potentially pointing that people enter a specific state of mind when engaging with art. In the current study participants (N=64) rated immoral behaviour as less negative in the context of art, which further suggests that different cognitive operations may be in place in this context. To create greater conceptual unity and provide a framework for future research, we propose the concept of Mode of Art eXperience (MAX), which brings together accounts spanning 2500 years of inquiry into this state of mind. We conclude that MAX is essential for maximising the art experience, not in utilitarian terms, but in terms of having a boundary-less meaningful engagement with art.

Keywords: Empirical aesthetics, Art, SeIns, Mode of art, Immorality, Morality, Negative emotions.

Presentation type: Oral presentation / Talk

Session: Experimental Aesthetics Following Fechner's Conceptions II

Allowing for Indecisive Outcomes: A Fair Comparison of Equivalence Tests

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Researchers often need to decide whether two conditions are practically equivalent. Linde et al. (2021, *Psychological Methods*) compared three methods that allow for such

a decision: (a) frequentist two one sided tests (TOST), (b) Bayesian highest density interval combined with a region of practical equivalence (HDI+ROPE), (c) Bayes Factor with an interval null prior (interval BF). Linde et al. concluded that interval BF has superior power to detect equivalence—especially for small sample sizes. However, they did not distinguish between 'indecisive' and 'evidence for inequivalence' outcomes of HDI+ROPE and interval BF. Instead, they pooled those outcomes as 'no evidence for equivalence' to make them comparable to TOST (which has only two outcomes). We redid their simulations, allowed for all three outcomes, and included a frequentist method with three outcomes: (d) the analogue of HDI+ROPE based on confidence intervals (CI+ROPE). Firstly, we again find superior power to detect equivalence of interval BF compared to all other methods. However, this superiority can be compensated by adapting the other methods' thresholds (cf. Campbell and Gustafson, 2021, *arXiv:2104.07834*). Secondly, we observe that, unlike HDI+ROPE and CI+ROPE, interval BF's 'indecisive' outcomes are more likely under inequivalence than under equivalence, resulting in an overall bias of the method in favor of equivalence. Notably, this bias cannot be eliminated by adapting symmetrical Bayes factor thresholds alone. These findings suggest that HDI+ROPE and CI+ROPE might actually be better suited to decide between equivalence, indecision, and non-equivalence of two conditions.

Keywords: Hypothesis testing, Equivalence testing, Bayesian, frequentist, Bayes Factor, TOST, HDI+ROPE

Presentation type: Poster Presentation

Session: New media and machine interaction

Neue Technologien als Chance? Technologieakzeptanz im beruflichen Kontext

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In einer von Digitalisierung geprägten Arbeitswelt ist die Akzeptanz neuer Technologien ein wichtiger Erfolgsfaktor für den wirtschaftlichen Erfolg von Unternehmen und für die Zufriedenheit von Mitarbeitenden. Ausgehend vom Technologieakzeptanzmodell (TAM) und dem Artificial Intelligence Acceptance Model prüft die vorliegende Studie, welche Faktoren Technologieakzeptanz im beruflichen Kontext beeinflussen. Innerhalb der Online-Studie wurden an N = 769 Teilnehmenden (M = 51.25, SD = 13.88 Jahre; 390 weiblich) die Konstrukte Technologieakzeptanz, Technologiebereitschaft, Adaptabilität, Vertrauen in Technologie, sowie Offenheit und Experimentierfreudigkeit untersucht. Dabei stand keine bestimmte Technologie im Fokus des Interesses. Die Teilnehmenden wurden vielmehr aufgefordert, „an eine neue Technologie zu denken, mit der sie im Beruf bereits in Kontakt gekommen sind". Die Prüfung dreier Strukturgleichungsmodelle zeigt, dass das TAM in seiner herkömmlichen Form für die Erklärung der Akzeptanz neuer Technologien nicht hilfreich ist und es einer Überarbeitung des etablierten Modells bedarf. Konkret sprechen die Ergebnisse für eine

Entfernung der Variable wahrgenommene Bedienfreundlichkeit aus dem TAM und für eine Aufnahme von Vertrauen in Technologie. Die individuelle Technologiebereitschaft ist zudem nicht hilfreich in der Erklärung von Technologieakzeptanz, zumindest nicht ohne Einbindung weiterer Mediatoren. Weiterhin werden zwei Variablen gefunden, die positiv auf Vertrauen in Technologie wirken: Adaptabilität und die organisationsbezogene Variable Offenheit und Experimentieren. Insbesondere die Adaptabilität sollte in der Technologieakzeptanzforschung zukünftig genauer untersucht werden. Das aufgestellte Modell erklärt mehr als zwei Drittel der Nutzungsintention einer neuen Technologie und liefert somit einen wichtigen Beitrag zum Verständnis der Akzeptanz neuer Technologien im beruflichen Kontext.

Keywords: Arbeitswelt, Digitalisierung, Technology Acceptance, Adaptability, Technology Readiness, AIAM, TAM

Presentation type: Oral presentation / Talk

Session: Technology acceptance and risk assessment

Modulation of Goal Persistence by a Co-Actor's Reliability in a Joint Goal-Setting Paradigm

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Goal-directed behavior requires an adaptive balance between goal persistence and disengagement. The present research investigated how a reliable vs. unreliable co-actor affected participants' goal persistence in a joint setup. In a novel paradigm, participant and a confederate moved the target in two steps from the bottom center to the top left or right corner of the screen. First, participants moved the target halfway towards either corner. Then, the confederate moved the target to its final position. In the first block, the confederate always followed the participant's choice. In Experiment 1, the confederate followed the participant in 50% (unreliable follower) vs. 80% (reliable follower) of trials in the second block (between). In Experiment 2, the confederate followed the participant in 50% of trials in the second and in 80% of trials in the third block (or vice versa; within). In Experiment 3, the confederate changed from block 2 to block 3 in addition. As DV we used the proportion of goal repetitions in dependence of whether the confederate had followed the participant's choice or not. In Experiments 1 and 3, results show increased goal persistence (goal repetitions) after the confederate did not follow the participant's choice. Crucially, this effect was stronger when the confederate was a reliable (80%) rather than an unreliable (50%) follower. Note that these effects were absent in Experiment 2. We conclude that interdependent goals are only maintained when the co-actor is perceived as reliable.

Keywords: goal persistence, goal disengagement, joint action, free choice

Presentation type: Oral presentation / Talk

Session: Current directions in free-choice paradigms II: What we can learn from giving more control to the participant

The Relationship between Feedback Processing, Working Memory Updating and Behavioral Adaptation: An ERP Study

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Performance monitoring, like processing errors and feedback, is thought to induce executive function in order to adapt subsequent behavior. However, whereas there is considerable research on feedback-based learning and executive functions, studying which executive processes are initiated by feedback has been neglected. To this end, we used an adapted Wisconsin Card Sorting Test and examined feedback processing while the electroencephalogram was recorded in healthy young adults (aged 18-29 years, N=27). We examined feedback processing via the feedback-related negativity (FRN), an event-related potential (ERP) reflecting the unexpectedness of feedback. Additionally, as a core component of executive functions, we examined working memory updating measured via the P3b. We assessed whether the amplitude of the FRN in one trial is associated with updating in this trial and the extent of behavioral adaptation in subsequent trials. Preliminary results suggest that participants' expectations of target behavior on subsequent trials were successfully induced, as reaction times decreased and accuracy increased with consecutive non-reversal trials. In line with these findings, P3b amplitudes decreased with outcome certainty, which is in accordance with assumptions about updating of working memory processes in this task, which in turn can influence behavior. Surprisingly, preliminary FRN data are not in accordance with coding for expectancy violations, as there was an increase in FRN amplitude across trials without a task switch, suggesting that the FRN does not work based on trial-based computations of expectation and thus shows a weaker link to the actual behavior.

Keywords: Cognitive control,working memory updating, feedback processing, behavioral adaptation, performance monitoring

Presentation type: Poster Presentation

Session: Cognitive flexibility

Real Brains in Virtual Worlds

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Decades of human brain imaging have used methods that are either too heavy to follow participants' movements (e.g., MRI) or that require participants to sit still or lie supine to avoid movement-related artifacts that might impact the feeble signal of interest (e.g.,

M/EEG). As a consequence of the restrictions of traditional imaging modalities, embodied cognitive processes and their underlying neural correlates reflecting the impressive capacities of the human brain to support flexible cognition during interaction with dynamic environments remain elusive. Recent technological advancements, however, have provided brain imaging modalities that are small and lightweight and allow for recordings of human brain activity in actively moving participants. In combination with virtual reality (VR), such systems enable controlled experiments beyond standard laboratory protocols. In combination with Mobile Brain/Body Imaging (MoBI) methods, VR offers new opportunities in cognitive neuroscience research introducing hitherto unknown possibilities for mapping out human brain function in ecologically valid scenarios. While a combination of virtual reality, motion capture, and brain imaging can assess the most important aspects of embodied cognitive processes, it further provides unprecedented opportunities for systematically manipulating the constituent factors of sensory-motor integration underlying natural cognitive processes with protocols that would not be possible without VR. I report results from MoBI experiments that reveal striking differences in brain dynamics underlying active behavior as compared to stationary protocols. The results give new insights into human brain activity during active behaviors and a critical perspective on problems arising from the combination of new technologies.

Keywords: Embodied Cognition, EEG, mobile EEG, Mobile BRain/Body Imaging, Spatial Cognition

Presentation type: Oral presentation / Talk

Session: Embodiment and perspective taking

A Simple Intervention Can Improve Estimates of Sugar Content

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Sugar overconsumption is a major health threat. For people to make healthy food choices they need to possess some knowledge about sugar; for instance, how much sugar is contained in a food item, or whether a food item contains more or less sugar than another item. Here we ask (1) how accurate is people's metric knowledge (e.g., mean, range) and mapping knowledge (i.e., relative ordering) of the sugar content of food items, and (2) can this knowledge be improved with a simple *seeding* intervention, in which the actual sugar content is provided for a few representative items? Participants (online experiment, N = 160) estimated the sugar content of various food items (in grams), then received feedback about the actual content for a few representative items (with or without additionally seeing the equivalent number of sugar cubes); a control group received no feedback. Finally, they estimated again the sugar content of (old and new) items. Our experiment revealed participants' lack of metric knowledge (they overestimated mean and range of sugar content of food items) but acceptable mapping knowledge (i.e., relative ordering). Seeding improved metric knowledge for seeded and

unseeded (i.e., transfer) items, and it improved mapping knowledge for seeded items. The additional visualization did not amplify the effects. A simple intervention can thus improve estimates of sugar content. Our research extends prior work on seeding interventions to the novel domain of sugar content.

Keywords: real-world estimation, seeding effects, transfer of knowledge, sugar content, health, nutrition

Presentation type: Oral presentation / Talk

Session: Decision making

Prediction-comprehension bias: How prediction success biases perceived 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 frameworks of reverse inference logic. In a set of four experiments (N = 552), 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 (i.e., inferring comprehension from prediction) that underlies the PCB. This finding points to the PCB stemming from failed reverse inference logic.

Keywords: bias, prediction, comprehension, reverse inference

Presentation type: Oral presentation / Talk

Session: Anticipation and prediction

What is "mild" COVID-19? Disease severity communication and its effects on risk perception and protective behavior

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Robert Koch-Institut

During the COVID-19 pandemic, public institutions and media outlets referred to possible severity levels of COVID-19 with a range of category labels. The most commonly used distinction in Germany was “mild” versus “severe”. “Mild” COVID-19 includes a wide variety of symptoms such as fever, loss of smell, and vomiting. However, laypeople who encounter the term “mild” may underestimate disease severity and as a result may be less likely to take protective measures against the disease. One way to avoid misinterpretations of disease severity labels is to provide explanations about the possible consequences of each severity level – a method used in meteorological forecasting and referred to as “impact-based communication”. In an online experiment, we plan to investigate how providing a list of possible symptoms of the disease in addition to the severity label (vs. label only) influences perceived risk of the disease and the likelihood to take up protective measures against it, e.g., taking a preventive medication. Furthermore, we investigate how people interpret disease severity levels by having them match a variety of symptoms to what they think is the appropriate severity category. Finally, we plan to investigate how previous knowledge and susceptibility beliefs about a certain disease influence the effects by comparing a condition in which we specify the disease as COVID-19 to a neutral condition in which we simply use the term “respiratory disease”. The study aims to provide a better understanding about how severity labels are interpreted by non-experts and ultimately improve future communication of disease severity.

Keywords: disease severity, risk perception, communication, misinterpretation, health, COVID-19

Presentation type: No-Data Poster

Session:

Evidence Accumulation Towards Collapsing Bounds? A Diffusion Model Analysis of the Response Time-Based Concealed Information Test

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The Response Time-Based Concealed Information Test (RT-CIT) is a recognition memory task used in lie detection to assess the knowledge of critical, crime-related information (Verschuere & De Houwer, 2011). Guilty participants typically negate recognition more slowly for the critical probe items than for irrelevant items. Explanations of the RT-CIT effect presume the involvement of different cognitive processes, including inhibition, task-switching, familiarity, and more conscious recollection. In the present research, we use sequential sampling models to identify the

component processes in RT-CIT task performance. We compiled and reanalyzed RT-CIT data from 15 published studies (N = 1870 participants). For guilty participants, distributional analyses of probe and irrelevant item response times consistently showed delta functions with positive slopes and first-order stochastic dominance (Speckmann et al., 2007). These results imply that relatively simple assumptions about the involved cognitive processes may suffice to explain RT-CIT task performance. Next, we tested 12 plausible sequential sampling models, including versions of the Drift Diffusion Model (e.g., Ratcliff, 1978) with constant and collapsing response bounds and the Racing Diffusion Model (Tillman et al., 2020). A model with collapsing bounds fitted the data best for guilty and innocent participants and captured the observed pattern of fast errors for target items. For guilty participants, the recognition of probe items, as reflected by the drift rate, was slower than for irrelevant items. We discuss implications for the involvement of specific cognitive processes and relate the results to the dynamic recognition model (Cox & Shiffrin, 2017).

Keywords: Recognition Memory, Lie Detection, Concealed Information Test, Diffusion Model

Presentation type: Oral presentation / Talk

Session: Cognitive modelling

Adaptation to context information for head fakes in basketball

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In basketball, an attacking player often plays a pass to one side while looking to the contrary side. This head fake provokes a conflict in the observing opponent, as the processing of the task-irrelevant head orientation interferes with the processing of the task-relevant pass direction. Accordingly, responses to passes with head fakes are slower and result in more errors than passes without a head fake (head-fake effect). The head-fake effect and structurally similar interference effects (e.g., Stroop effect) are modulated by the frequency of conflicting trials. Previous studies mostly applied a block-wise manipulation of proportion congruency. However, in basketball (and also in other team sports) it might be important to spontaneously adapt to the individual fake frequency (e.g., 20% vs. 80%) of opponents. Therefore, the present study investigates the possibility to quickly (i.e., on a trial-by-trial basis) reconfigure the response behavior to different proportions of incompatible trials, which are bound to different basketball players. Results point out that participants (N = 34, M_{age} = 22.0) adapted to the fake-frequency of different basketball players: Participants showed a head-fake effect for the basketball player who performed a head fake in 20% of the trials, no head-fake effect for the basketball player who performed a head fake in 50% of the trials, and a reversed head-fake effect for the basketball player who performed a head fake in 80% of the trials. The effects found here are suggested to rely on cognitive control settings (attentional control) and on lower-level learning (stimulus-response associations).

Keywords: sport psychology, conflict adaptation, context-specific proportion congruency effect

Presentation type: Oral presentation / Talk

Session: Perception and Action in Sports

The effects of perceptual load in processing faces

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Perceptual load theory proposes that processing of distractor stimuli is determined by the level of perceptual load (Lavie, Hirst, De Fockert & Viding, 2004). We conducted a study with female and male names as targets, the presentation of neutral faces as distractors, and a variation of perceptual load. In a comparable study, He and Chen (2010) observed the disappearance of the interference effect of faces at high perceptual load, in line with perceptual, load theory. However, Lavie (2003) earlier found that even for high perceptual load flanker effects for (famous) faces were found. In our first version of the study with neutral expression faces participants categorized names that were conventionally female or male, into their respective genders. The target was presented with 1, 3, or 5 pseudo-names (i.e., the variation of perceptual load). A distractor male or female neutral face was presented either to the right or left of the name and pseudonyms, creating either congruent or incongruent trials. Our results showed a congruency effect regardless of the set size, in line with Lavie's earlier result and in contrast to He and Chen. We discuss these findings with regards to an adaptive and social necessity for processing all faces, even if they are unfamiliar and irrelevant to the task at hand.

Keywords: Perceptual load, faces

Presentation type: Poster Presentation

Session: Cognitive control and conflict

It's the dynamics, Baby! – Dynamic facial features influence evaluative priming effects

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In evaluative priming (EP), task-irrelevant prime valence that influences the target's evaluation is taken as an index for the automatic processing of the prime valence. In research with emotional expressions, emotions are taken as a promotor of valence. However, not only emotions but also other aspects (i.e., group) feed into the priming

effect (Weisbuch & Ambady, 2008). Ingroup (outgroup) and happy (fearful) faces are positive (negative) in valence. Thus, two features can modulate priming results separately (Paulus & Wentura, 2018) or interactively (Weisbuch & Ambady, 2008). The latter indicates that happy ingroup and fearful outgroup faces are considered relatively more positive, suggesting that faces are processed according to their social message (Paulus & Wentura, 2014). The ecological validity of faces in a given context might influence whether they are processed in an integrated manner, according to their social message, or separately. Thus, we aimed at replicating the interactive effects found in EP (Weisbuch & Ambady, 2008) using dynamic emotional primes. Both features were presented for 300 ms, then one of the features changed dynamically for 200 ms and the final face was presented for another 100 ms. Emotion in Experiment 1, and ethnicity in Experiment 2 were the dynamic features. Results indicated that the dynamic feature compared to the static one led to greater priming effects; however, no interaction was observed. Implications of results for the parallel processing of multiple features in EP and the boundary conditions of the social message were discussed.

Keywords: Evaluative Priming, Implicit evaluation, Emotional expression, Dynamic emotional faces

Presentation type: Oral presentation / Talk

Session: Emotional faces in social cognition: New approaches and recent insights

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Field evaluation of a vehicle interior concept to support social interaction during automated driving

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The goal of the research project RUMBA, which is funded by the German Federal Ministry for Economic Affairs and Climate Action, is to redesign the user experience for occupants during an automated drive (SAE level 4) by developing innovative interior and interaction concepts. As part of the second iteration of the user-centered, iterative development process, a field study will be presented. It aims to evaluate a prototype of an innovative vehicle interior concept for social interaction during automated driving as well as to identify design suggestions for its further development. The vehicle interior concept to be evaluated will be compared with a classic vehicle interior in a field-experimental research setting. The test subjects experience each vehicle interior over 30 minutes during a simulated automated drive in real traffic. During the ride, subjects play an online board game together: In one condition, the subjects are seated in driving direction and play on their respective tablet. In the other condition, they sit facing each other and play on a shared tablet. Besides others, user experience, behavior, system trust and subjective road safety of the occupants are measured. The contribution reports the methodology as well as first results of the evaluation study.

Keywords: Automated driving, user-centered development, user experience, vehicle interior, simulation prototype

Presentation type: Oral presentation / Talk

Session: Automation while driving – current problems and approaches

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It could be so easy: Privacy by design of cookie consent pop-ups

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The purpose of consent pop-ups is to enable users to make informed decisions about the use of cookies and protect users' privacy while browsing. However, while many users claim to be concerned about their privacy, they do not behave accordingly (privacy paradox), e.g., when accepting all cookies. One reason for this behavior could be the design of some consent pop-ups, which intentionally makes it difficult for users to reject cookies (a dark pattern). Therefore, the question arises whether individual privacy concerns guide the decision to accept or reject cookies, or whether the pop-ups' design determines the disclosure behavior. To answer this, we conducted an online study (N = 71) in which a consent pop-up (privacy friendly vs. dark pattern 1 vs. dark pattern 2; between-subjects) was presented. Participants were told to test the usability of a website and the pop-up appeared before they were redirected to the allegedly website. An ANCOVA was calculated with privacy concerns as the covariate and the number of accepted cookie categories as the dependent variable. A large effect was found for the different pop-up designs ($\eta_p^2 = 0.36$) and no effect for privacy concerns on the number of accepted cookie categories. When participants could reject the different categories directly (privacy friendly design), they did it more often than when the rejection could only occur in a second interaction step (dark patterns). In summary, users protect their privacy, even if they are not concerned about it, when the consent pop-up is designed privacy friendly.

Keywords: cookies, dark pattern, privacy by design, privacy paradox, nudging

Presentation type: Poster Presentation

Session: New media and machine interaction

Semantic Paired Association to Odors and Memory Interferences

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Odors are often considered to be powerful cues of memory. However, early olfactory paired-associates studies showed that odors are not particularly effective associative cues, or are effective only for the first associated target. This led to the belief that proactive interference is particularly strong in odor-associative memory. Interestingly, research with other modalities has found that semantic similarity between stimuli in a paired-associate caused retroactive interference. In Study 1, we explored the efficiency of odors as cues in a paired-associates paradigm in comparison to verbal and auditory stimuli when they were semantically congruent vs incongruent with the target. In Study 2, we measured proactive and retroactive memory interference in paired-associate memory to odors versus verbal and auditory stimuli. The results of both studies will be discussed in light of previous research on paired-associated memory and assumptions of unique olfactory associative memory.

Keywords: Olfaction; Memory; Semantic Paired-Association; Memory Interference

Presentation type: Poster Presentation

Session: Memory and working memory

Metacognitive effects of context reinstatement across episodic and semantic memory tasks

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There are multiple examples of episodic information contributing to judgments concerning semantic memory. For example, in the illusory truth effect participants are misled by fluency resulting from episodic processing into believing more confidently that certain statements are true. But do recollections of specific episodic events also affect assessments of one's semantic memory? Here we assessed this issue by comparing the effects of reinstating the encoding context at the time of retrieval – a manipulation facilitating retrieval of specific episodes of previous study – on metacognitive judgments accompanying both episodic and semantic memory tasks. Participants studied verbal materials presented against contextual background photographs and were later asked either to recognize words that were studied or to recognize synonyms and antonyms of these studied words. In Experiment 1, prospective metacognition in the form of feeling of knowing judgments was examined. Experiment 2 examined retrospective metacognition in the form of confidence judgments. In both experiments, reinstating encoding context at the time of retrieval robustly affected metacognitive judgments in the episodic memory tasks, but had no discernible effect on metacognitive judgments in the semantic memory tasks. Thus, while people may become confused by episodically-induced fluency when retrieving information from semantic memory, they seem capable of separating episodic recollection from the appraisal of semantic retrieval.

Keywords: Metacognition, Episodic memory, Semantic memory

Presentation type: Oral presentation / Talk

Session: Learning and memory retrieval

Studying memory disruption by 'irrelevant' speakers in a virtual-reality scenario

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The irrelevant speech effect (ISE) refers to the disruption of verbal short-term memory by background speech. It has been studied in numerous laboratory experiments, which typically, exhibit low ecological validity compared with a real-life environment with multiple speech sources. Therefore, we set out to investigate the ISE in a virtual reality (VR) scenario permitting to position both target and interfering speakers in audio-visual space. In Experiment 1, participants were exposed to either a slow (1 syllable / 700-ms; N = 39) or a fast (1 syllable / 200-ms; N = 40) presentation rate of a sequence of task-irrelevant letters seamlessly uttered by either one or three distractor speakers distributed in space while they had to memorize a sequence of digits pronounced (at a rate of 1/s) by a target speaker. The results indicate that while the basic ISE is robustly replicated in VR, more complex spatial effects based on the auditory segregation of speakers failed to reach statistical significance. In Experiment 2, the auditory presentation of the to-be-remembered material (target speaker straight ahead) was contrasted with its visual presentation (digits presented on a virtual laptop) while improving the spatial layout of the audio-visual scene (N = 60). The results are discussed in terms of the role of spatial auditory streaming in modulating the memory impairment produced by distracting speech.

Keywords: Irrelevant speech effect (ISE); Working memory; Serial recall; Virtual Reality (VR)

Presentation type: Poster Presentation

Session: Auditory processing

The energetic footprint of predictive processing

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The brains' ability to predict sensory input and infer its sources guides a wide range of cognitive processes. While predictive processing clearly optimizes informational aspects of perception and decision making, a biologically realistic implementation must

take the energetic limits of brain metabolism into account. Interestingly, theoretical and empirical studies suggest that minimizing the mismatch between internally generated predictions and bottom-up input also minimizes energetic cost. However, the relationship between conventional imaging techniques like BOLD and EEG and metabolic processes is complex, indirect, and difficult to obtain on a systems level. To address this methodological shortcoming, we here apply a novel multiparametric MR method that quantifies the cerebral metabolic rate of oxygen on a voxel level during visual stimulation with varying levels of predictability. Using a statistical learning paradigm, we show that oxygen use is affected throughout large networks, extending beyond local peaks of activity in functionally specialized regions. Furthermore, interindividual variability in prediction error cost scales with subjective confidence regarding learning performance. The resulting metabolic differences exceed five percent on a network and whole-brain level - an effect magnitude usually observed only locally or between different tasks. In summary, our quantitative MR method shows that valid predictions are central to the brain wide energy balance as large amounts of resources are allocated to process deviations. Finally, the explanatory power of confidence ratings shows that cognitive energy expenditure can be derived from metacognitive judgements that fit within a Bayesian framework.

Keywords: Predictive Coding, Prediction Error, Confidence, Efficiency, MRI, Metabolism

Presentation type: Oral presentation / Talk

Session: Anticipation and prediction

Social Sampling from Online and Offline Contacts

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Decision makers often infer population-level social statistics such as risk frequencies or consumer preferences by recalling people from their own social networks from memory—that is, by *social sampling*. Although people's social interactions increasingly occur on social media rather than through face-to-face contact, it is unclear which influence online social media contacts have on people's inferences. In this study, we examine to what extent social sampling is affected by whether one usually interacts with a person online or offline, and which weight online contacts have for people's inferences. Participants judged the prevalence of different health issues (e.g., anxiety disorders) and recalled people in their personal social networks who had experienced each issue. For each recalled case, participants indicated the primary mode of contact (offline, online, or mixed) and the social category (self, family member, friend, or acquaintance). Based on Bayesian hierarchical mixture modeling, we compared sequential, limited social sampling strategies guided by either contact mode or social category to exhaustive search and guessing. Most participants were best described by a strategy that assumes limited rather than exhaustive search. Social sampling based on contact mode provided the best account for around a third of participants. The

estimated model parameters suggested that participants relied less strongly on information from online contacts than on information from other social subgroups. Thus, in addition to demonstrating that the mode of contact is used to guide social sampling, our results suggest that social media contacts are less important for people's inferences than face-to-face contacts.

Keywords: sampling, online networks, decisions under uncertainty, probabilistic inference, heuristics

Presentation type: Oral presentation / Talk

Session: Strategic information search in inferences and decisions under uncertainty

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The Influence of Prototypicality on the Perception of systemic Discrimination

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Various studies demonstrated that a situation's similarity with a person's prototype of discrimination vastly influences this person's perceived discrimination (prototype-effect [PE]; Baron et al., 1991). Even though PE seems to be one of the best investigated and robust effects in the field, underlying psychological processes remained mainly unclear. The most prominent explanatory approach describes prototypes as anticipatory beliefs, that shape expectations about discrimination equivalent to representative heuristics (Inman & Baron, 1996; Kahneman & Frederick, 2002). in contrast, Rodin and colleagues (1996) assumed judgments of discrimination to correspond with attribution of blame processes. Based on this view, PE would occur because prototypical discrimination was seen as more morally reprehensible. The aim of the present line of study was to investigate PE in systemic discrimination and to disentangle the two explanatory approaches. In the first (summarized information presentation; N=38) and second experiment (sequential presentation; N=72) PE was replicated for systemic discrimination. The third experiment (N=172) presented either high or low severity of discrimination. The interaction of severity and prototypicality was theorized to be an indication of moral processes but did not reach significance. In the fourth experiment (N=220), morality and expectation were induced either before or after information sampling. Both concepts were manipulated orthogonally by using non-human stimuli. The main effect of expectation reached significance, while main effects of morality and presentation order as well as their interactions did not. Summarized, while PE seems to be a robust effect, only support for expectation as a driving force of PE has been found.

Keywords: discrimination perception, systemic discrimination, prototypicality, prototype effect, expectation, illusory correlation

Presentation type: Oral presentation / Talk

Session: Social cognition

The Effect of Transition Strategies on Take-Over Behavior in Automated Driving

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Technology advancements allow car manufacturers to introduce highly automated vehicles into the market in the foreseeable future. However, as long as vehicles are not fully autonomous, transitions between different levels of automation take place and imply shifts in the driver's role and responsibilities. In case of system limits, the driver may intervene in the driving task. As drivers will likely perform non-driving-related activities during automated driving, transitions to lower levels require the driver to re-establish situation awareness to intervene safely. Therefore, this work discusses two strategies how the driver's situation awareness might be re-established before taking over the driving task. A 2 x 2 within-subjects design was employed with transition strategy (monitoring or initiating a maneuver) and type of transition (manual or automated maneuver) as independent variables. In a driving-simulator study, participants experienced a highly automated drive on a rural road. While participants engaged in a non-driving related task (NDRT), the vehicle approached a rear-end collision, due to which an intervention request was issued: participants were either asked to monitor the environment or to initiate an overtaking maneuver upon system availability. The subsequent maneuver had to be performed either manually (involving a take-over request) or was performed by the vehicle in automated mode. Effects on gaze behavior, manual driving performance, and subjective measurements were investigated. Both strategies decreased the odds of interleaving and positively affected driving safety. The strategies are discussed in light of their suitability for different transition contexts, and recommendations for the design of control transitions are derived.

Keywords: Highly Automated Driving, Transition Strategies, Monitoring, Maneuver-Initiation, Driving Safety

Presentation type: Oral presentation / Talk

Session: Experimental Engineering Psychology

Circadian and homeostatic modulation of human retinal function: A pre-registered study protocol

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Background Daily variation in our physiology and behavior at the 24-hour scale are governed by two independent processes, an endogenous circadian rhythm and a sleep homeostat. Through the retinohypothalamic pathway, which carries information from the retina, the hypothalamus responds to light in order to synchronize the internal circadian rhythm to the external environment, rendering visual input an important circadian signal. The link between visual signals and the circadian system may be bi-directional, i.e., the sensitivity of the visual system to light may be modulated by the circadian clock itself. Methods Building upon converging evidence for a of time-of day dependency in image-forming (e.g. luminance perception) and non image-forming functions (e.g. pupillary light response), we will disentangle circadian and homeostatic effects on early stages of visual processing in a pre-registered study. We will use the constant routine protocol spanning 34 hours with healthy participants (n = 24) staying awake in a constant dim light environment, and providing repeated measures of ocular structures and functional mechanisms in 3-hour intervals. Our focus will be on assessing photoreceptor sensitivity using silent-substitution pupillometry, and characterising post-receptoral retinal mechanisms underlying luminance and color perception using psychophysical threshold measurements. To estimate circadian phase, we will collect circadian biomarkers, including salivary melatonin and core body temperature. Relevance This study will characterize the circadian and homeostatic influence on retinal mechanisms, informing how daily variations in physiology influence how we process light in the environment.

Keywords: vision, retina, circadian rhythm, preregistration, chronobiology, longitudinal, constant routine

Presentation type: No-Data Poster

Session:

Sad music, bad performance? Exploring the effects of background music on cognitive performance and pupillary activity

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The present study aims to investigate the effect of different types of background music on behavioral and physiological measures in a variety of cognitive tasks. A total of 40 participants were asked to complete four cognitive tasks (immediate recall, delayed recall, phonemic fluency, trail-making) in a 2x2 (fast/slow tempo x positive/negative valence) within-subjects design. Throughout the study, participants wore a mobile eye tracker to record pupillary activity in addition to behavioral measures. Behavioral data show that participants performed worse on the immediate recall task when listening to

slow and negative background music while they performed better on phonemic fluency when listening to fast and positive music, compared to the other type of music, respectively. Eye-tracking data including pupil dilation will be analyzed to find indicators of cognitive activity corresponding to the behavioral results. The collected behavioral data were analyzed using ANOVAs and mixed-effect models, while pupillary activity was pre-processed and then calculated using IPA and LHIPA (Duchowski et al., 2020) metrics. We will present and discuss both these measures, their correlations, and their implications with a focus on the eye-tracking data.

Keywords: Eye-Tracking, Music, LHIPA, Cognitive Load

Presentation type: Oral presentation / Talk

Session: Aesthetics and perception

Selective reinforcement of task switching: Boundary conditions and individual differences

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Adapting a learning perspective on cognitive control, we aimed to test whether the regulation of cognitive flexibility versus stability can be learned through rewards. In a line of task switching studies, we systematically reinforced either task switches or repetitions more to test whether this leads to more voluntary task switching (flexibility) or repeating (stability) on unrewarded free choice trials. In a first set of experiments, where these free choice trials were interspersed between cued reward trials, we found evidence for increased task switching following rewarded switches in an instructed but not uninstructed experiment version. The absence in the latter might be explained by design complexity overshadowing subtle manipulation effects. In a third experiment version, using a simpler, uninstructed design with free choice trials only, we again observed successful adaptation to the reward scheme – even on trials with masked reward feedback. In a fourth experiment, we used both cued and free choice trials but in a blocked manner. While we did find a reinforcement effect in the pilot study, it disappeared in a large (n=496) sample. Here, distinct susceptibility to the reward manipulation might be linked to individual differences assessed with psychiatric questionnaires, or other sample characteristics. Together, these studies help determine whether and when people can learn about the value of task selection strategies beyond the scope of a single task, and provide a self-regulating system to understand putative higher-order control processes.

Keywords: task switching, reward, selective reinforcement, meta-control, cognitive control, free choice

Presentation type: Oral presentation / Talk

Session: Current directions in free-choice paradigms I: What we can learn from giving more control to the participant

A cognitive model testing different interventions to prevent harmful mind-wandering during driving

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In this study, we contrasted six different models to show the effects of different interventions by adaptive automation systems designed to prevent mind-wandering while driving. Although cognitive load associated with secondary tasks tends to affect driving negatively (e.g., Unni et al., 2017; Salvucci & Macuga, 2002; Ito et al., 2001), sometimes a simple secondary task can improve driving performance when the situation is mundane (e.g., Engström et al., 2017; Nijboer et al., 2016). Nijboer and colleagues (2016) have hypothesized that if the driving task is simple, people might start mind wandering, which interferes with driving (Yanko & Spalek, 2013, 2014; Martens & Brouwer, 2013). A simple secondary task, which imposes less workload than mind-wanderng, could prevent this from happening. Automation system that adapt to the cognitive state of the driver could leverage this effect by inducing mild cognitive load during mundane driving scenarios with the goal to improve driving performance. To test suitable interventions, we combined an existing driver model (Salvucci, 2006) with an existing model of mind wandering in the cognitive architecture ACT-R (van Vugt et al., 2015) and tested different interventions that impose cognitive workload in different amounts during specific times of the simulation. Using these different models we, firstly, show how mind-wandering harms driving performance, secondly, show that mild cognitive load can mitigate this effect and, lastly, show that adapting to the cognitive state of the model incurs a significant processing cost that adaptive automation systems have to account for.

Keywords: Cognitive modeling, driving, workload, ACT-R, adaptive automation

Presentation type: Oral presentation / Talk

Session: Modeling and experimental validation in real-life environments

Capacity Limitations of Distractor-Response Bindings

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Upon a behavioural response, associations between stimuli and the reaction are integrated in a temporary memory trace named event file. Reencountering a component causes the retrieval of the the entire event file, leading to interferences and performance impairments if only some parts are repeated and others 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 has shown that these links can be formed effortlessly without assumptions of capacity limitations. This study investigates the role of working memory for such bindings by testing capacity-related boundaries. In a distractor-response binding paradigm, polygons were presented in a grid consisting of one target, one distractor and 0, 3 or 7 additional task-irrelevant polygons. If the size of an event file (i.e. the amount of arbitrary bindings) is finite, distractor-response binding effects are expected to be reduced or eliminated at larger set sizes. The results are discussed in the context of established action control and working memory literature.

Keywords: distractor-response binding, event file, action control, capacity, working memory

Presentation type: Oral presentation / Talk

Session: Binding

Modelling the magnitude sensitivity effect in confidence and response time

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Magnitude sensitivity refers to the effect that decisions between two alternatives/stimuli tend to be faster when the intensities of both alternatives (e.g., luminance, size, or preference) are increased even if their difference is kept constant. Previous studies proposed several computational models to describe decision and response time distributions in experimental paradigms with changes of stimulus magnitude. However, with only two dependent variables, i.e., responses and response times, there is a high degree of model mimicry. We suggest to include confidence judgments as an additional dependent variable in experiments and models. We generalized several previously proposed dynamical models of confidence and response time to account for magnitude sensitivity by adding intensity-dependent noise parameters. We present three experiments, two brightness discrimination tasks and a motion discrimination task, in which the intensities of both alternatives were varied and confidence judgments were recorded. The data show that confidence increases with stimulus magnitude, even if accuracy remains constant. Previous studies explained increasing confidence but constant accuracy with stimulus magnitude by a positive evidence bias, i.e. for the computation of confidence, people allegedly rely only on the evidence supporting their decision and ignore evidence for the alternative. However, according to the present study, the apparent positive evidence bias can be alternatively explained as a result of the dynamics of the decision process. We suggest that identification of computational models of decision making can be improved by considering decisions, reaction times, and confidence at the same time.

Keywords: sequential sampling models, confidence, magnitude sensitivity, computational modeling, response times, decision making, drift diffusion model

Presentation type: Oral presentation / Talk

Session: Cognitive modelling

The influence of ongoing task load on time-based prospective memory performance

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Time based prospective memory describes the ability to remember to execute an intention at a predefined future time point while being engaged in an ongoing task. This study addresses the question of how increasing the difficulty of the ongoing task affects prospective memory performance. To investigate this, participants are presented with a word-picture-matching task as an ongoing task. We show 2, 4 or 6 words at different screen positions (depending on the assigned difficulty condition). One of these positions is highlighted after word presentation. Participants have to decide whether the word at this position matches the picture that is presented afterwards. Participants perform this task for 40 minutes. As a prospective memory intention, participants have to remember to press the space bar and type-in a word every 5 minutes. Participants can call a screen clock by pressing an additional key at any time while they perform the task. Data collection is still ongoing but preliminary analyses suggest that prospective memory, clock checking and ongoing task performance were negatively affected by higher ongoing task difficulty manipulations. Results will be discussed in the context of time-based prospective memory theories.

Keywords: prospective memory, time-based, cognitive load

Presentation type: Poster Presentation

Session: Memory and working memory

Applying an Advice Taking Approach to Moral Cognition Research - The Case of Asymmetric Moral Conformity

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Though models of moral cognition recognize the importance of social influences, experimental investigations of conformity effects in moral judgment are surprisingly rare. A notable exception, Bostijn and Roets (2017a) demonstrated greater conformity to “deontological” than to “consequentialist” majorities when judging moral dilemmas. Although the authors interpreted this “asymmetric moral conformity effect” in terms of a strategic shifting of responses away from consequentialist towards deontological judgments, this could not actually be investigated, as only post-manipulation judgments

were measured. We reinvestigated this finding by conducting a direct replication (dataset 1), as well as an extension, in which initial judgments were assessed prior to final judgments, which enables a direct test of the shift hypothesis (dataset 2). Dataset 1 (N = 242) replicates the original asymmetric conformity effect, showing that deontological majorities reduced consequentialist judgments, whereas consequentialist majorities exerted no influence, both compared to a no-majority control condition. Dataset 2 (N = 483) manifests a marginal interaction between majority condition and initial judgments such that, when initial judgments were consequentialist, deontological majorities reduced the likelihood for final judgments being consequentialist, whereas consequentialist majorities exerted no influence, which provides weak support for the shift hypothesis. Moreover, and unexpectedly, when initial judgments were added, deontological and consequentialist majorities both influenced final judgments, resulting in a symmetrical moral conformity effect. This finding suggests limitations to the asymmetric conformity effect and illustrates how the advice taking paradigm could provide a useful tool for investigating moral cognition.

Keywords: advice taking, moral judgment, conformity, social influence

Presentation type: Oral presentation / Talk

Session: Advice taking and beyond: Judgment formation via advice taking, sequential collaboration, and belief updating

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Building experiments in R

Felix Henninger

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Over the past decade, the R environment for statistical computing has firmly established itself as the standard for data processing in psychology and many social sciences. It provides a multitude of data handling and analysis capabilities, and is now routinely taught to students early on. Despite the widespread familiarity of researchers with R, building experiments has heretofore often required picking up an entirely new programming language and skillset. We present a versatile, high-performance package for constructing and running experiments in R, and demonstrate its timing capabilities. The package builds upon the powerful functionality present in the R ecosystem, allowing for direct integration of data collection and processing, and more advanced designs such as adaptive experiments. With it, researchers at every career stage can now apply their knowledge of R to the construction of experiments. More information is available at https://felixhenninger.com/2023/experiments-in-r

Keywords: experiment, software, R, teaching, open source

Presentation type: Oral presentation / Talk

Session: Conducting and implementing experiments

Anticipatory Actions in a Drag and Drop Task

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We typically adapt the initial segment of a movement sequence to the requirement of later segments. Such behavior has been well documented in grasp selections for object manipulation or locomotion. I examined whether such behavior can also be observed in a virtual drag and drop task, in which participants first move the mouse cursor onto a virtual object and then drag the object to a target location. A first experiment revealed that this was indeed the case. Click positions on the virtual object where inversely related to the direction and extent of the upcoming drag and drop movement. Surprisingly, participants frequently selected click positions that resulted in longer-than-necessary cursor movements. In a second experiment, it was assessed whether click positions in Experiment 1 were frequently suboptimal because they depended not only on the upcoming drag and drop action but also on other potential drag and drop actions. Experiment 2 corroborated this hypothesis. Click-positions for a specific drag and drop actions depended considerably on other drag and drop actions required in the respective experimental block. In summary, the experiments showed that participants adapt click position to the demands of subsequent drag and drop movements. While the direction of click position adjustments strictly depends on the upcoming movement, the extent of click position adjustments additionally depends on the drag and drop actions that are required in the same context.

Keywords: Action, Motor Control, Anticipation, Mouse Movements, Action Planning

Presentation type: Poster Presentation

Session: Motor and action control

The influence of stress on risk-taking behavior: A cognitive modeling approach

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Often, risky decisions have to be made under stress. Since risk-taking can have far-reaching consequences, it is important to understand the influence of stress on risk-taking behavior. To get a better understanding of this topic, this study (N=40, 50% female) examined behavior in the Balloon Analogue Risk Task (BART) and its underlying processes under social stress induced by the Public Speaking Task. For that, a mixed design with the within-subject factor ‘time’ (pre vs. post measurement of the BART) and the between-subject factor ‘experimental group’ (control vs. experimental group) was used. In addition, we modeled the cognitive processes underlying behavior

in the BART using the Bayesian Sequential Risk Model (BSR). Based on previous findings, we hypothesized that individuals under stress would show more risk-taking behavior and that this effect would be more pronounced in men than in women. We expected effects of the stress manipulation on the reward sensitivity and the choice consistency parameters of the model. Due to subjective ratings, the stress manipulation was effective as participants in the experimental condition reported a higher stress level after the stress induction. Unexpectedly, there were no differences in risk taking with and without the stressor or between genders, and also no differences in the postulated BSR parameters. However, the BSR learning parameter was reduced from the first to the second measurement of the BART only in the control group. This finding implicates that stress influences the learning during the BART. Thus, the learning process within the BART should be further examined.

Keywords: risk-taking behavior, Balloon Analogue Risk Task (BART), stress, cognitive modeling, Bayesian Sequential Risk Model (BSR)

Presentation type: Oral presentation / Talk

Session: Attitude formation and decision making

No conclusive evidence for number-induced attentional shifts in a temporal order judgment task

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The Spatial Numerical Association of Response Codes (SNARC) effect refers to the observation that relatively small (e.g., 1) and large numbers (e.g., 9) elicit faster left-sided and right-sided manual responses, respectively. In a variation known as the attentional SNARC effect, merely looking at numbers caused a left- or rightward shift in covert spatial attention, depending on the number's magnitude. In our study, we probed the notion that numbers induce shifts of spatial attention in accordance with their position on a mental number line (MNL). Critically, we removed any putative spatial response code that may contaminate the responses. We used a square and a tilted square as targets, thereby situating the decisive response dimension in the ventral, non-spatial processing stream. In two experiments where numbers were used as non-informative cues preceding a temporal order judgment (TOJ) task, we did not observe a deflection of the locus of spatial attention as a function of the numerical magnitude of the cue. In a third experiment, finding a significant modulation of TOJ performance as a function of the pointing direction of arrow cues allowed us to rule out the possibility that the absence of any significant modulation in experiments 1 and 2 was due to a lack of sensitivity of our task set-up. We conclude from the current findings that the spatial codes that the perception and naming of numbers potentially elicit are not in and by themselves sufficient to elicit deflections of spatial attention.

Keywords: attentional SNARC, numerical cognition, spatial attention, prior entry, spatial numerical association

Presentation type: Oral presentation / Talk

Session: How spatial are numbers?

On the modulation of human motor learning by predictive reward and punishment

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In his famous law of effect, Thorndike (1911) already suggested the rate of skill acquisition to be negatively related to the time interval between a motor response and its positive or negative outcome. If true, this might have consequences for acquiring the sensorimotor transformations involved in movements with inherently delayed outcome feedback, as in throwing a ball towards a target. In the present study, we investigated whether the predictive presentation of outcome feedback (i.e., before it became naturally available) modulated behavioral and neurophysiological correlates of motor learning and action monitoring during the acquisition of a goal-directed throwing task. 44 right-handed participants who practiced a semi-virtual target throwing task called Skittles were randomly divided into two groups that differed with respect to the timing of augmented auditory feedback signaling a hit or miss of the target. The predictive feedback group (predFB) received the auditory feedback immediately after ball release and thus before the naturally available outcome feedback, whereas the normal feedback group (normFB) received the auditory feedback at the time it naturally occurred. The most conspicuous finding was that event-related EEG potentials associated with action monitoring revealed striking differences in the shape of the event-related response to the presentation of feedback as a function of presentation time. In addition, results show a clear modulation of frontomedial and posterolateral potentials according to trial context. These results highlight the importance of feedback timing for human motor learning and the necessity of considering action monitoring within its extended temporal context.

Keywords: skill acquisition, reinforcement learning, motor skills, feedback

Presentation type: Poster Presentation

Session: Motor and action control

The role of inhibition in task-interruption situations

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In the present study, we examined whether an ongoing primary task is inhibited when switching to an interruption task. To this end, we implemented the n-2 backward inhibition paradigm (Mayr & Keele, 2001) into a task-interruption situation. Subjects performed two primary tasks comprising a pre-defined sequence of three subtasks (e.g., ABC). There were non-interrupted and interrupted primary tasks. In interrupted primary tasks, an interruption task occurred before the last subtask of a primary task, resulting in a n-2 repetition or a n-2 switch demand in the first post-interruption subtask. We found that switching back from the interruption task to the primary task resulted in n-2 switch costs in the first subtask after the interruption. This finding indicates that the last subtask performed before the interruption remains activated rather than being inhibited when switching to the interruption task.

Keywords: cognitive control, task interruptions, inhibition

Presentation type: Poster Presentation

Session: Cognitive control and conflict

Sampling and Integration Strategies Can Shape Decisions from Experience

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At least 2 information-processing tasks underlie decisions from experience (DFE): information search (sampling) and information integration. Which strategies do we use to solve these tasks and how does their interplay shape the process of preference construction? Here, we model the interaction of different sampling and integration strategies within a sequential sampling framework. We simulate the implied sampling and decision processes for a set of binary choice problems. We find that the interplay of sampling and integration strategies can produce various systematic choice patterns. For instance, with a round-wise integration of outcomes, changes in the sampling strategy shift preferences for average returns to frequent returns. Such a shift causes low rates of expected value maximization and a robust underweighting of rare outcomes pattern. We also use cumulative prospect theory (CPT) to model the simulated choice data. While accounting for sampling error, we find that shifts in choice patterns due to changes in the information-processing strategies are reflected in characteristic shapes of CPT's value and weighting function. For instance, preference for frequent returns due to a round-wise integration of outcomes and a back-and-forth sampling mechanism are linked to an S-shaped weighting function and a highly compressed value function. Our findings highlight that commonly observed choice patterns in DFE can be explained in terms of strategic responses to underlying search and integration tasks. They also

underscore the potential of integrating different model classes and the potential of descriptive models such as CPT to capture characteristics of the actual information-processing mechanisms.

Keywords: decisions from experience, sampling, information integration, computational modeling, prospect theory

Presentation type: Oral presentation / Talk

Session: Strategic information search in inferences and decisions under uncertainty

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Individual internet search history predicts openness, interest, knowledge and intelligence

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Here we tested whether individual text corpora can predict big-5 personality traits and compared the resulting virtual with the survey-based openness for the prediction of interests, knowledge and intelligence. Via histories of an internet search engine, we generated individual corpora for 94 participants, with an average of three million word token. We then computed an individual semantic structure for each participant and examined the similarity of this structure to label words, which were adjectives from a well-established lexical approach to big-5 personality traits. A simple linear regression analysis showed that the similarity of the individual semantic structures to the label word “academic” (“gelehrt”), for instance, approaches the meta-analytically reproducible explained variance for survey-based openness in computational social science. We also used a nonlinear neural model based on the 30 best label words to predict the diagnostic assessment of personality. The virtually estimated big-5 provided by far better predictions for the corresponding diagnostic trait than previous computational approaches, while the respective dimension hardly accounted for variance in the other dimensions. The neural models also generalized well, when running them 1000 times using 10-fold cross validation. Virtual openness provided similar predictions for intellectual interests and level of education as the survey-based approach. For fluid intelligence, two diagnostic assessments of crystallized intelligence and particularly for knowledge in humanities, virtual openness even provided slightly better predictions than the survey-based openness. In sum, our machine learning approach answers Cattell’s challenge of freeing adult tests from the assumption of uniform knowledge across participants.

Keywords: Machine learning, word2vec, natural language processing, language models, big-5, intelligence-as-process, Cattell-Horn-Carroll theory

Presentation type: Oral presentation / Talk

Session: Memory, Speech and language processing

The Role of Working Memory in the Relation Between Mental Rotation and Postural Stability

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Dual-task paradigms consistently reveal stabilizing effects of mental rotation tasks on postural stability in healthy young adults. Other studies suggest that mental rotation ability might be a predictor of postural stability. However, the question of how the relationship between mental rotation and postural stability can be explained remains open. A potential explanation may be the visuospatial sketchpad of working memory and its sub-components, spatial working memory (SWM) and object working memory (OWM). Studies show interference between mental rotation and SWM and between mental rotation and OWM. In contrast, only the link between SWM and postural stability is known. This study aims to provide an overview of how mental rotation, postural stability and the two components of visual-spatial working memory, SWM and OWM, are related in healthy young adults. Based on a G*Power analysis, we aim to collect data from 89 participants. Each participant will perform three cognitive tasks (Mental Rotation Task, Corsi Block Task and Chinese Character Recognition) and a postural stability task (single leg stance on an AMTI-OR6-7-2000 force plate) in randomized order. We hypothesize that mental rotation ability and postural stability will correlate positively. SWM should correlate positively with mental rotation ability and postural stability whereas OWM should only correlate positively with mental rotation ability. Exploratively, it will be investigated if SWM is the best predictor of postural stability among mental rotation ability, SWM and OWM. Data collection is ongoing and the results will be finalized before the conference. The study is preregistered on osf.io.

Keywords: postural stability, mental rotation, working memory

Presentation type: Poster Presentation

Session: Memory and working memory

A Model-Based Approach to Motivated Forgetting of Unethical Behavior

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Motivated forgetting is a popular explanation for unwarranted moral self-perceptions. Yet, morality-related motivated forgetting (‘moral forgetting’) lacks conceptual preciseness. Our goal was to advance the conceptual understanding of moral forgetting with a cognitive modeling approach. Specifically, our goal was to test the fundamental

conceptual assumptions, namely that moral forgetting represents self-serving systematic information loss (i.e., is immorality- and agency-specific) and that moral forgetting originates from inhibited information retrieval. We used the multinomial storage-and-retrieval model (Riefer & Rouder, 1992) to separate storage and retrieval processes. In an adapted version of Riefer and Rouders' (1992) incidental paired-associate learning task, we asked participants in a within-subjects design to imagine a sequence of immoral behavior descriptions that referred to the participant as the behavior-performing agent or the behavior-involved patient. After a filler task, participants completed a free-recall-then-cued-recall paradigm. In the recall tasks, participants had to recall capitalized neutral noun pairs that were embedded in the behavioral descriptions. Contrary to our expectation, the model-based results of Experiment 1 (*N*=119) did not indicate worse retrieval of information associated with the agency-related immoral encoding context. Whereas the modeling approach revealed in fact better retrieval of information associated with the agency-related immoral encoding context, the results, however, supported moral forgetting in the form of worse storage of information associated with the agency-related immoral encoding context. The findings emphasize the value of cognitive modeling as a tool to promote conceptual preciseness in social cognition research. We validate the results of Experiment 1 in a second experiment.

Keywords: Memory, Motivated Memory, Morality, Episodic Memory, Forgetting, Multinomial Processing Tree Modeling, Social Cognition

Presentation type: Oral presentation / Talk

Session: Forgetting

Effect of regularity on the behavioral and neural tracking of musical phrases

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Music can be seen as a hierarchical structure, constituted of phrases built on smaller units (notes and beats). Empirical evidence shows that listeners are sensitive to notes and beats and can track phrases of regular length when listening to music (Teng, Larrouy-Maestri, & Poeppel, preprint, 2021). However, natural music is not always regular. Here, our study aims at generalizing previous findings to musical stimuli composed of phrases of different lengths. Thirty-five participants were asked to passively listen to stimuli while their brain activity was recorded with EEG; to complete a behavioural task during which they had to press a button when noticing an onset or offset of music phrases; and to complete questionnaires about musicality and music preferences. The experimental stimuli were created based on themes extracted from J.S. Bach fugues, with length varying from 3 to over 20 beats per phrase. In the regular

condition, we used phrases of 4 and 8 beats; in the irregular condition, melodies were constituted of phrases of various length. A control condition was created by shuffling the generated melodies to deconstruct the phrase structure while preserving the acoustic quality. Preliminary analysis of the behavioural data revealed higher agreement for the regular/irregular conditions compared to the shuffled one. Interestingly, listeners can track phrases regardless of regularity. The current analysis of the EEG data will shed light on the effects observed and help to clarify the cognitive processes underlying the perception of regular and irregular musical phrases.

Keywords: music cognition, phrase boundaries, regularity, segmentation

Presentation type: Poster Presentation

Session: Auditory processing

Modeling the influence of variance on active search in category learning

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When learning to discriminate categories in real life, people may actively search for exemplars of each category to establish a representation of the categories. We investigate the influence of category variance, i.e., by how much the exemplars vary from one another, on search length, using a novel category learning task in which participants sampled category exemplars until they felt they could categorize the objects. We manipulated the categories' variance by using a low, medium, and high level of distortion from a prototype. In two experiments, we could show that participants' search was affected by the category's and the counter category's variance level. Here, we propose a cognitive model of the search process assuming a within-category learning process and a between-category discrimination process. We assume that the within-category learning rate is determined by the variance dependent uncertainty – conversely the amount of information - participants experience while forming a category representation. Specifically, we assume that participants compare the probability distribution of a category exemplar with a uniformly distributed prototype. We formalize the discrimination process as differences in the amount of information between the two categories. We find that the model better predicts participants' sampling behavior than a model predicting sampling based on the distortion level or a model without a discrimination process. These results indicate that search in self-regulated category learning depends on the information gained by sampling within a category and the ease with which categories can be discriminated.

Keywords: category learning, sampling, cognitive model, search

Presentation type: Oral presentation / Talk

Session: Computational Approaches to Modeling Cognition

UX Design Pattern for Data Protection and Trust

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Cookie banners are mandatory for most websites because of the EU's General Data Protection Regulation (GDPR). The present study investigates if persuasive UI elements like dark and white patterns affect the user experience (UX) and perceived trust of people. In an online experiment with 52 participants, we compared the effects of a non-persuasive cookie banner with two types of dark pattern and a white pattern design. The perceived usability and overall UX were rated lower on the cookie banner with strong Dark Patterns than with Neutral Design. Dark Patterns were rated higher in positive emotions than the neutral design. Users with high technological affinity rated trustworthiness higher when interacting with strong Dark Patterns than with neutral design. The last two results could be evidence for the manipulative effect of Dark Patterns called Dark Patterns Blindness which raises the question: is it time to show more responsibility towards users and create an ethical awareness amongst stakeholders and designers? The practical implications of the study's findings are discussed.

Keywords: Human-Computer-Interaction, Interaction Design, Design Pattern, Persuasive Computing

Presentation type: Oral presentation / Talk

Session: Experimental Engineering Psychology

Investigating affective conflict produced by emotional facial expressions of ingroup and outgroup members

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Affective conflict arises when stimuli or stimulus features of opposing valence are processed. A prototypical example is a negative picture paired with a positive word. Kozlik and Fischer (2020) hypothesized that emotional ingroup and outgroup faces can also create an affective conflict, when the emotional expression and the affective connotation of group membership mismatch, e.g., a happy outgroup member (but see Wentura & Paulus, 2022). To further test the hypothesis of an affective conflict, we used different stimulus configurations of assumed affective conflict and tested for congruence sequence effects across stimulus configurations. Two stimulus configurations were presented in random order: (a) pictures of ingroup vs. outgroup persons displaying positive vs. negative facial expressions and (b) pictures of ingroup vs. outgroup persons

with neutral facial expressions superimposed by positive vs. negative words. In all trials, the task was to indicate the group membership of the depicted person. Although these stimulus configurations hold apparent differences, both contain two distinct affective features that either match or mismatch, and thus can result in an affective conflict. If the two different stimulus configurations contain the identical source of (affective) conflict, the congruence sequence effects should not only be observed in a repetition of stimulus configuration but also when stimulus configurations switch between trials. Currently, we are still in the process of data collection, but the complete data will be presented at the conference.

Keywords: affective conflict, group membership, facial expression, cognitive control, conflict adaptation

Presentation type: Poster Presentation

Session: Emotion cognition

Partial repetition benefits: An index for compositional coding of behavior in dual tasks with low dimensional overlap

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We ask how complex (dual-action) behavior is mentally represented in dual tasks. Three different representation accounts were empirically tested. According to a compositional (Structuralist) account, component action remains structurally intact when combined with another action. In contrast, a holistic (Gestalt) account posits that dual-action requirements are represented holistically and entirely distinct from its component action requirements. Finally, a contextual change account assumes that a change in context (e.g., from single- to dual-action requirement) generally impedes response retrieval, similar to repeating a response while the task context switches. We analyzed trial-by-trial effects in a single/dual switch paradigm (SDS paradigm, involving a randomized mix of single- and dual-task trials) combining an auditory-vocal task and a visual-manual task. Relevant comparisons of performance between complete switch trials (e.g., between the two single tasks) and partial repetition trials (e.g., from dual to single task) revealed partial repetition benefits, that is, for both the auditory-vocal and the visual-manual task, and for both single- and dual-task performance. For example, executing a manual response in a current dual-task trial benefitted from having executed a manual response in the previous single-task trial. The pattern of results persisted across several days of performance. Therefore, dual actions in the present dual-task setting are mentally represented in a compositional, Structuralist fashion throughout, likely resulting from low between-task dimensional overlap. The results will be discussed within a theoretical framework of flexible representation of behavior.

Keywords: Action Control; Dual Task; Multitasking; Task Switching; Task Integration; Representational Flexibility

Presentation type: Oral presentation / Talk

Session: Dual tasks and action control

Semantic Accounts of Risk Perception

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Individuals face an increasingly large number of social and technological risks. How these risks are perceived is of critical interest to researchers and policymakers alike. In recent years, researchers have demonstrated that high-dimensional word embeddings derived from text have the potential to improve the prediction of risk perception (Bhatia, 2019). A further alternative and potentially more powerful approach is free association: past research has found embeddings derived from free associations to be more predictive of human judgments and behavior than those derived from text. Analyses by Bhatia (2019) suggest that embeddings trained on free associations are better at predicting risk perception than embeddings trained on text and on par with the so-called psychometric approach to risk perception, which uses human jugdments on nine central dimensions of risk. We build on this work by collecting risk ratings and psychometric ratings for a larger set of risk sources (n=1004), and evaluate a collection of psychometric, text-based, and free association-based representations in terms of their ability to predict risk perception (all prediction is done at the aggregate, rather than the individual participant level). We find that despite being trained on orders of magnitudes less data, the free association-based embeddings are top performers in both the individual and ensemble representation comparisons, with an ensemble of the psychometric and free assations explaining over 90% of the risk perception variance. Finally, we investigate how our model can be applied to improve the communication of risk information between researchers, policymakers, and the general public.

Keywords: risk perception, free association, vector space models

Presentation type: Oral presentation / Talk

Session: Public health and disorders

Mechanisms underlying forward simulation in action understanding

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Mechanisms underlying forward simulation in action understanding During action observation, people represent the observed action unfolding in time and this

representation speeds up the recognition of the next action states compared to the backward states. In this talk we will discuss the nature of this mental stimulation as well as the possible mechanisms underlying action anticipation. We hypothesize that there are at least two processes: (1) an action prediction mechanism, by which people simulate the next states of the observed action through a representation of the action unfolding in time; (2) a goal prediction mechanism, by which people infer the final goal of the observed action based on the physical properties of the object.

Keywords: action observation, mental simulation, anticipation

Presentation type: Oral presentation / Talk

Session: Perceiving and understanding cues in others' actions

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Evaluative Conditioning Beyond CS-US Pairings: How People Integrate Multiple Affective Stimuli into Conditioned Attitudes

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Evaluative Conditioning (EC) is the change in liking of a conditioned stimulus (CS) due to its pairing with a positive/negative unconditioned stimulus (US). EC research has so far focused exclusively on pairings with a single US within a situation. However, natural environments are arguably more complex, leading to pairings with more than one affective stimulus at a time. Here, we investigate EC in situations with multiple USs. In five experiments (total N = 389, all preregistered) with different materials and pairing procedures, we paired CSs with one/two positive/negative USs simultaneously. We find that two USs do not influence people's conditioned attitudes in a mere additive fashion. Instead, people average the valence of multiple USs with a stronger weight of negative USs. This weighted averaging leads to two non-additive patterns: First, pairings with multiple US of the same valence exert the same conditioning effect as pairings with only one US of that valence. Second, the EC effects of one US is strongest if no second US is present and weakest if another negative US is present. We show that these non-additive patterns cannot be explained by weakened memory for stimulus pairings or by US revaluation effects. Further findings indicate that people most likely integrate multiple affective experiences in a situation already at learning. We discuss the implications of our research for theories on and practical applications of evaluative conditioning.

Keywords: Evaluative Conditioning, Information Integration, Affect, Learning, Attitudes, Memory

Presentation type: Oral presentation / Talk

Session: Emotion and cognition

Modeling Quantitative Judgments of Realistic Stimuli

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Studies of processes of multiple-cue judgments usually rely on artificial stimuli with predefined cue structures. One reason for using these simple and artificial 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. As a proof-of-concept, in the first study, we show that an MDS analysis of similarity ratings well recovers predefined cue structures of artificial stimuli and that using these MDS-based attributes as cues in a cognitive model to analyse data from an existing experiment leads to the same inferences as when the original cue values were used. In the second study, we use the same procedure to replicate previous findings from multiple-cue judgment literature, using complex stimuli with an unknown a priori cue structure.

Keywords: quantitative judgments

Presentation type: Oral presentation / Talk

Session: Computational Approaches to Modeling Cognition

Unsigned surprise but not reward magnitude modulates the integration of motor elements during actions

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It seems natural that motor responses unfold smoothly and that we are able to easily concatenate different components of movements to achieve goal-directed actions. Theoretical frameworks suggest that different motor features have to be bound to each other to achieve a coherent action. Yet, the nature of the “glue” (i.e., bindings) between elements constituting a motor sequence and enabling a smooth unfolding of motor acts is not well understood. We examined in how far motor feature bindings are affected by reward magnitude or the effects of an unsigned surprise signal. We show that the consistency of action file binding strength is modulated by unsigned surprise, but not by

reward magnitude. On a conceptual and theoretical level, the results provide links between frameworks, which have until now not been brought into connection. In particular, theoretical accounts stating that only the unexpectedness (surprisingness) is essential for action control are connected to meta-control accounts of human action control.

Keywords: surprise signals, reward, action integration, meta-control, theory of event coding

Presentation type: Poster Presentation

Session: Motor and action control

Examining the illness narratives of diabetic patients through semi-structured interviews

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The emergence of a chronic disease can disrupt everyday meanings and social relations and makes a person uncertain about the fundamental dimensions of their identity. These disintegrated contents must be restructured, which process builds up the illness narratives. Illness narratives are stories that patients tell primarily about their experiences related to the illness and not simply about the illness process and treatment. With the examination of these narratives, the patients' points of view and experiences with their illnesses become more and more understandable for professionals. Thus, it is an increasingly researched area, which we would like to expand in Hungary as well. Our present study aims to explore the illness narratives of people living with type 1 or 2 diabetes (10-12 people per group) using semi-structured interviews. The interview questions are from the McGill Illness Narrative Interview (MINI). To analyse the answers, the grounded theory content analysis method will be used. The method of grounded theory is suitable for looking for common and different psychological characteristics in the narratives of the target groups without prior hypotheses. The current study is part of a longer research process. We are currently collecting data online, using a questionnaire among people living with diabetes. In the meantime, we are recruiting participants for the interviews, which would start in January. Although we do not have concrete results yet, by the time of the conference we will certainly have presentable, illustrative results and conclusions.

Keywords: diabetes, illness narratives, MINI, semi-structured interviews

Presentation type: Poster Presentation

Session: Health and environment

Retrospective Information Distortion

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Before people decide between options, such as different hotels, when planning a vacation, they tend to systematically distort sequentially presented information about the options in the direction of their emerging preferences. This distortion effect leads to a more coherent representation of information and thereby helps people experience the decision situation as less complex than it is. In a study with 260 participants, we compare how participants distort information that is currently shown versus that has been shown before. Some distortion effects are similar: Information about the preferred option is evaluated more positively than information about the non-preferred option, independently of whether the information is present or has been presented before. Some effects are, however, dissimilar: Information that is incongruent with the current preference (i.e., negative information about the preferred option and positive information about the non-preferred option) is more strongly distorted in retrospect. In contrast, information congruent with the current preference (i.e., positive information about the preferred option and negative information about the non-preferred option) is distorted more strongly when present. We discuss how a coherence-based network model of information distortion can explain these effects.

Keywords: information distortion, memory, coherence-based reasoning, decision-making

Presentation type: Oral presentation / Talk

Session: False information and memory

The Mechanism Underlying the Irrelevant Speech Effect: Phonological Processing or Rehearsal?

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The irrelevant speech effect (ISE) describes the disruption of visual – verbal serial recall performance through task-irrelevant background speech. According to the changing-state account (CSA), the ISE results from sound-induced impairments of the serial rehearsal process that participants use to maintain the item sequence. Aiming to explore the role of rehearsal in the ISE, we minimized rehearsal use through rapid visual presentation of the list items. In contrast to the prediction of the CSA, the ISE was not abolished or diminished with a rapid when compared to a slow presentation rate. We argue that irrelevant speech does not specifically affect serial rehearsal, but impairs phonological processing in general. In a current experiment, we investigate the ISE in the standard serial recall task, and in a phonological processing task that does not require serial order retention and strongly discourages a rehearsal strategy. This allows direct comparison of the ISE on both tasks. The results will be compared with those from earlier experiments, and implications for dominant accounts of the ISE are to be discussed.

Keywords: Working Memory, Rehearsal, Phonological Processing, Irrelevant Speech Effect

Presentation type: Poster Presentation

Session: Auditory processing

Haptic exploratory movement adjustment to prior visual cues depends on their quality and frequency

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During haptic exploration of groove-ridge gratings, humans adjust their movement directions to be orthogonal to the gratings' orientation. This adjustment is based on sensory information and improves perceptual precision. Previously, we demonstrated that prior visual cues indicating a texture's orientation produce a similar adjustment already at initial contact; the more so the higher the priors' quality. Here we elucidated the relationship between the frequency distribution of prior qualities and the learning of adjustments in a between-group comparison. Each trial, participants explored two gratings with equal amplitude. They had to report the stimulus with the higher spatial frequency. Stimuli were given in six different orientations. Priors on grating orientation were given in three different qualities: 50% (excellent information), 15% (medium-low), and 0% (none) for group 1 and 50%, 25% (medium-high), and 0% for group 2. We analyzed movement directions of the first, middle and last strokes over the textures of each trial. The results reveal no substantial prior-based movement adjustment for group 1, but strong effects for group 2 with an increase of initial orthogonal strokes and a decrease in variability of movement directions with higher qualities. Thus, we confirmed that prior quality affects the degree of movement adjustment and additionally conclude that a certain frequency of at least medium or better quality information is crucial for establishing adjustment behavior in the first place.

Keywords: multisensory, visual cueing, haptic exploration

Presentation type: Oral presentation / Talk

Session: Anticipation and prediction

Mobile EEG during a human-scale Morris Watermaze task in patients with medial temporal lesions.

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As we move through physical space, various sensory modalities including proprioception and the vestibular sense contribute to the formation of spatial representations. We investigate the role of the medial temporal lobe in human navigation and how it is influenced by the multisensory input during physical locomotion, using the approach of Mobille Brain-Body Imaging (MoBI) to combine mobile EEG with immersive virtual reality. We implemented a human-scale Morris watermaze task in stationary and MoBI setups to test 10 participants that underwent right medial temporal lobe resection (MTLR), each with two matched control (CTRL) participants. A previous work on the data set (Iggena et al., in prep) showed boosted spatial memory performance in the MoBI condition in both participant groups. Notably, the analysis of motion data indicated that the two groups use different strategies to make use of the additional multisensory information in MoBI setup, where MTLR group showed heavier reliance on the body-based (egocentric) strategy and the CTRL group displayed more active sampling of environment-centered (allocentric) information. As the medial temporal lobe houses critical structures for formation of allocentric spatial representations, the difference in strategy may originate from MTLR group recruiting egocentric information formed in intact areas other than the medial temporal lobe as a compensatory mechanism to keep robust representations. We present the relevant change in EEG power dynamics on the source level, localized to the parietal cortex as a basis of processing of body-based information, and the retrosplenial complex, the hub for conversion between ego- and allocentric reference frames.

Keywords: hippocampus, reference frame, spatial navigation, spatial memory, mobile EEG, immersive VR

Presentation type: Oral presentation / Talk

Session: Spatial Navigation

Executive functions in mono- and bilingual children: Factor structure and relations with fluid intelligence

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The effects of bilingualism on executive functions (EF) and intelligence are still controversially discussed. Most studies focused on performance differences without considering the underlying structure of cognitive abilities. Thus, we examined whether the structure of EF and the relations of EF with intelligence differ between mono- and

bilingual children. A total of 240 elementary school children (mean age = 8;6 years, 133 monolinguals, 95 bilinguals) performed two tasks measuring working memory, inhibition, cognitive flexibility, and fluid intelligence, respectively. Confirmatory factor analyses (CFA) showed that one common EF-factor provided the best fit to the data in both language groups, indicating that bilingualism is not associated with differences in the EF structure at this age. Moreover, there were no latent performance differences, neither in EF nor intelligence between mono- and bilingual children. However, we found a stronger relation between a common EF-factor and fluid intelligence in bilingual as compared to monolingual children, implying a closer coupling of latent processing (EF) and inference (intelligence) abilities in bilingual children. This contributes to explain the previous heterogeneous findings on the task level, because more closely coupled cognitive functioning can be slightly beneficial for some tasks, and irrelevant or even slightly obstructive for others.

Keywords: Bilingualism, executive functions, intelligence, childhood, SEM

Presentation type: Oral presentation / Talk

Session: Tell me and talk to me – the influence of language on goal-directed performance

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Reliability of congruency and proportion congruency effects in the temporal flanker task

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Brandenburg Medical School Theodor Fontane (MHB)

Interest in cognitive control processes is large not only in basic but also in applied research such as clinical psychology, where individual differences in conflict processing are seen as a factor underlying different types of psychopathology. Nevertheless, it remains an open question whether behavioral measures of conflict- and control-related effects reflect stable, trait-like abilities. Here, we investigated the reliability of the congruency effect and its modulation by proportion congruency in the temporal flanker task (n = 32). In line with previous findings, analyses revealed pronounced response time increases when distractor and target were incongruent compared to congruent trials (indicating reliability on the group level). Split-half (odd-even) reliability measures of this congruency effect amounted (Spearman-Brown corrected) to .80 and larger. Reliability for the proportion congruency effect, i.e., the increase of the congruency effect with increasing proportion congruency (which is a difference of a difference), however, dropped to corrected *r*s between .44 and .76. Given the good split-half reliability at least for the congruency effects, we also estimated retest reliability and thus stability of the measures by means of a second session after 5 months. Preliminary data of 16 participants yielded retest-reliability estimates of $r>.75$ for the congruency effects and of $r>.63$ for the proportion congruency effects. Implications for the appropriateness of the temporal flanker task to measure individual differences in cognitive control will be discussed.

Keywords: cognitive control, flanker task, congruency effect, proportion congruency, reliability, individual differences

Presentation type: Oral presentation / Talk

Session: Cognitive control

Hand movement trajectories as an indicator of cognitive activity in VR

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The N-back task is a typical experimental paradigm for measuring working memory (WM). Introduced by Kirchner (1958), the N-back task is the most dominant measure of WM and its neurological substrates. It is widely discussed in neuroimaging studies with little emphasis on behavioral results (Conway et al., 2005). Studies mainly use classical settings, i.e., participants react to stimuli on a computer monitor by pressing keys on a keyboard. In these tasks, stimuli such as digits or letters are typically used, while response accuracy and response times are indicators of the level of difficulty of the task. We recreate this task in Virtual Reality (VR), where we collect 3D movement trajectories of participants instead of only keypresses, tracking participants' reactions in real-time. We then compare performance in this adapted task to that of a corresponding task performed using a keyboard and a computer screen. We report the general method for this adaptation of the N-back task in VR with the goal of providing a behavioral index that can combine well with physiological data. Our results show that this method can be used for many adaptations of memory paradigms and provides a wealth of information about the time course of cognitive processing that is usually obtained with physiological measures. Moreover, it can combine well with these measures, providing opportunities for future research, especially with VR technology.

Keywords: Working Memory, N-back, Virtual Reality, Movement Trajectories.

Presentation type: Oral presentation / Talk

Session: Working memory

The persistence of control states: Applying the fade-out paradigm to dual tasking

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Cognitive control processes can mirror fast and dynamic adaptations towards a changing environment. When performing dual tasks (DT), control states are established

that help to manage between-task interference. One frequently investigated aspect of cognitive control concerns the generality and persistence of these control states. Such induced processing adjustments can persist even if new stimuli or task sets are introduced (Surrey et al., 2017). In the present study, we investigated to which extent control states are maintained even if major characteristics of the task context change, e.g., if one of the tasks of a dual task becomes irrelevant. For this, we adapted the fade-out paradigm (Mayr & Liebscher, 2001) to a dual-task setting. In a first experiment, participants (*N* = 40) underwent blocks of DT to establish dual-task-specific control states. In the following block, one of the tasks was eliminated. Results showed that performance in this fade-out block did not immediately drop to single-task performance (fade-out costs) representing the persistence of control states. In a second experiment (*N* = 80), the proportion of between-task interference in DT blocks was manipulated (75% vs. 25% incongruent trials) between participants to establish conflict-biased control states. These conflict-induced control states did not modulate fade-out costs. Nevertheless, the control adaptations persisted because the size of between-task interference during fade-out depended on the conflict proportion manipulation. These findings suggest that control states influence multitasking performance at two distinct levels – the task-set level and the level of between-task interference. Implementations of this new evidence are discussed.

Keywords: dual tasking, cognitive control, control states, fade-out, list-wide proportion congruent effect

Presentation type: Oral presentation / Talk

Session: Cognitive control

Encouraging acceptance of automated heat adjustment through framing of regulatory focus and social identities

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Individuals are motivated towards pro-environmental behavior in a variety of ways. One approach can be through activation of their social identities, by emphasizing the collective (vs individual) benefits of a behavior. Another approach is framing regulatory focus, where promotion or prevention strategies towards achieving a behavior can be emphasized. We investigated these two concepts in a 2x2 experimental design, for intention to reduce indoor heating. Changes in heating behavior have previously been shown to contribute greatly to reduction in energy consumption, but not much research into possible interventions yet exists. Beyond the main effects, the interaction is of interest, as previous research suggests a fit effect of prevention focus with a collective framing. Our survey (N = 455 from Austria) presented a comic introducing an automated heat demand response scheme (i.e., allowing one's heat provider to reduce and increase room temperature within a temperature band depending on available renewable energy), framed in either individual vs collective terms, as well as promotion

vs prevention terms, followed by a measure for intention to participate in such a scheme. Results show a significant effect of the promotion intervention (b = .495, p = .032) and a marginal effect of the interaction (b = .564, p = 0.080) in the expected direction, where we hypothesized a collective framing interacting with the prevention strategy. Further investigation into the effects of regulatory focus framings on collective pro-environmental intentions and behaviours is encouraged.

Keywords: regulatory focus theory, social identity, pro-environmental behavior intentions, heating reduction, demand response schemes

Presentation type: Oral presentation / Talk

Session: Social cognition

Comparing a new webcam-based system with the Eyelink 1000

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The aim of this poster is to present conducted comparison study of eye-tracking systems. One of the systems was integrated into the Labvanced platform for online experiments and the second one was a “gold standard” lab-based eye-tracker (Eyelink 1000 - SR Research). We simultaneously recorded data with both eye trackers in five different tasks. These tasks were a subset of a standardized test battery for eye trackers, including a large grid task, smooth pursuit eye movements, viewing natural images, and two head movement tasks (roll, yaw). The results show that the webcam-based system achieved an overall accuracy of 1.4°, and a precision of 1.1° (between subjects), an error of about 0.5° larger than the Eyelink system. Interestingly, both accuracy (1.3°) and precision (0.9°) were slightly improved by presenting targets centrally on the screen, the region of interest in many psychophysical experiments. Remarkably, the correlation of raw gaze samples between Eyelink and webcam-based was at about 90% for both free viewing and smooth pursuit. Overall, these results put the performance of the 1 webcam-based system roughly on par with mobile eye-tracking devices (Ehinger et al., 2019; Tonsen et al., 2020) and demonstrate substantial improvement compared to existing webcam eye-tracking solutions (Papoutsaki et al., 2017). Given these findings and the fact that a large proportion of eye-tracking research uses such stimuli/area-of-interest sizes, we conclude that the presented webcam-based system can support a considerable fraction of eye-tracking research performed today.

Keywords: Eye Tracking, Labvanced, Eyelink 1000, Online Studies, Webcam Eyetracking

Presentation type: Poster Presentation

Session: New media and machine interaction

Improving the understanding of UAV acceptance and aesthetics in metropolitan regions.

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Unmanned Aerial Vehicles (UAVs) or Systems (UAS) acceptance are predominantly featured in qualitative research. Various UAV applications are being tested in Germany. Thus, experience with UAVs or UAS can hardly be collected. Societal acceptance is considered critical for successfully implementing UAVs in Transportation systems. Therefore, a systematical approach is important to evaluate the influential factors behind UAV acceptance and their interdependence. We present the experimental results of 24 undergraduate participants who rated 81 stimuli regarding acceptance and aesthetics. Pictures of Quadcopters in two saliencies (orange, white) and two usages icons (commercial, medical), as well as pictures of a helicopter with the same markings and a goose, were superimposed over background scenes in different areas (industrial, rural, urban). Participants were asked to classify the objects to ensure awareness of usage. A survey assessed the reasons for the participant's acceptance ratings in the experiment. Results demonstrated that the usage had the largest impact on acceptance ratings, followed by the Area of operation and Salience. For example, objects with medical usage were accepted irrespective of other factors. Commercial objects were more accepted in industrial areas, and commercial UAVs were more accepted than commercial helicopters. In the survey, the factors usefulness, traffic relief, reduction of privacy, and acceptance by society were, on average, rated as most influential in the acceptance ratings. The study design made the results of UAV acceptance comparable. These systematic findings could benefit the discussion of acceptance of UAV use, as it depends on various contextual factors with different importance.

Keywords: UAV, UAM, acceptance, aesthetic, experiment, survey, visual

Presentation type: Oral presentation / Talk

Session: Topics of Traffic Psychology

Unsupervised Learning Captures Scene Category Specific Information During Early and Late Processing While Failing to Capture High-Level Scene Structure.

Aylin Kallmayer, Melissa Vo

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Real-world scenes are complex and rich in information, yet we understand scenes quickly and seemingly effortlessly. Key to understanding vision is understanding the computations and the structure of representations that support efficient processing. We hypothesize that we exploit scene structures by learning hierarchical object-to-object and scene-to-object relations captured by a scene grammar. Does unsupervised learning automatically lead to representations that reflect properties of scene grammar? To assess how well scenes generated by generative adversarial networks (GANs) capture real-world scene structure perceived over time we conducted an EEG experiment. Participants viewed 180 generated scenes across six categories (30 exemplars per category) and performed a surprise categorization task. Generated scenes varied in their "realness" as assessed by three different measures from previous experiments: ratings, false-alarm (FA) rates, and categorization performance for 50 and 500ms presentation times. We were able to decode scene category from generated scenes with peak performances around 140 and 640 ms, suggesting that generated scenes contain scene category specific information used during early, as well as late processing. To test whether activation patterns across time could predict our behavioral measures, we ran ridge regularized regressions for each timepoint. Models predicting ratings and FA rates in the 50 ms condition achieved highest performance (peak around 330 ms). Surprisingly, categorization performance could not be predicted by the neural signal irrespective of presentation times. We conclude that while generated scenes contain scene category specific information during early and late processing, they fail to capture high-level scene structure usually exploited for scene categorization.

Keywords: scene perception, scene Grammar, unsupervised learning, generative adversarial networks, eeg

Presentation type: Poster Presentation

Session: Scene perception

Behavioral and organizational research on advice-based decision making: A systematic review

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Advice plays an important role in how people make decisions in virtually all walks of life. Researchers, for instance, revise their work in response to their peers' suggestions. Managers and CEOs seek expert advice before making important business decisions. As research on decision making has flourished in recent years, so has research on advice. To gain a more comprehensive understanding of this work, we conducted a systematic review of 143 empirical studies of advice-based decisions published in

management or psychology journals between 2006 and 2020. We identified two distinct streams of literature. The first, behavioral research, features experimental research on advice-based decisions conducted in laboratories. The second, organizational research, features observational field research on advice-based decisions in organizations. We organized the findings from the two research streams around three sequential stages: advice solicitation and provision, advice utilization, and the outcomes of advice-based decisions. Our review reveals the two streams to be highly complementary—with behavioral research focusing primarily on advice utilization and organizational research focusing primarily on advice solicitation. We identify key challenges for future research, such as greater emphasis on the social aspects of advice-based decisions and the continued development and refinement of normative benchmarks. In the talk, we will provide an overview of studies on advice-based decisions conducted over the last 15 years in behavioral and organizational research.

Keywords: advice taking, advice giving, psychology, management, organizational behavior

Presentation type: Oral presentation / Talk

Session: Advice taking and beyond: Judgment formation via advice taking, sequential collaboration, and belief updating

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The Effects of Emotion and Expectation on Time Perception

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The expectation of an event sometimes feels last longer or shorter in duration. Temporal distortions might be increasing, especially if there are not enough cues for when or how likely an event will occur. Emotional aspects of an expected event may also play a modulating role in temporal distortions. From this perspective, this research examined the effect of temporal and probabilistic uncertainty on the temporal judgment of emotional and neutral stimuli. In Experiment 1, subjective time perception was tested at three levels of temporal uncertainty by manipulating the onset of the emotional or neutral picture after a cue. The results revealed that the duration of earlier presented stimuli was underestimated while the later presented stimuli were overestimated. In Experiment 2, temporal distortions were tested at three probabilistic uncertainty levels by manipulating the probability of delivering the emotional or neutral picture after a cue. According to the probabilistic uncertainty results, the temporal overestimation effect was observed in the low expectation while the underestimation effect in the high expectation. However, in both experiments, uncertainty did not reveal a differential effect for emotional and neutral stimuli. The opposing effects of temporal and probabilistic uncertainty on time perception are discussed on the basis of attentional mechanisms and arousal effects.

Keywords: temporal uncertainty, probabilistic uncertainty, predictability, emotion, time perception

Presentation type: Oral presentation / Talk

Session: Spatial and temporal perception

Cognition, personality and road safety of seniors: cross-sectional results from the DoBoLSiS project

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Background: Driving is a complex activity that requires sensory, motor, and cognitive skills. These abilities may decline with age, which can affect the fitness to drive. Other characteristics of an individual such as age, gender, personality traits, attitudes toward driving, self-image, compensatory strategies and health status are also associated with driving behavior. The present study aims to investigate associations between these person characteristics and driving behavior and to identify possible risk factors for impaired driving competence and increased risk of accidents. Methods: In this study, 377 older drivers (66-78 years of age) completed a driving simulator ride, from which a risk index for driving behavior was determined. Subjects also completed questionnaires on traffic safety-related topics (e.g., driving habits, driving motivation, self-image, attitudes toward driving) and performed various tests to assess cognitive functions (e.g., different facets of attention, traffic-specific comprehension). Results: Four main variables contribute to the explanation of variance in person-specific risk index: Gender, self-attribution of driving competence (offensive driving), overview acquisition, and constancy of attentional focus. Age and emotional stability/lability (neuroticism) also appear to be related, albeit to a lesser extent, to driving behavior, particularly to significant violations of traffic rules in the driving simulation. Discussion: Overall, the current analysis revealed potential risk factors for driving behavior of senior drivers. Whether these factors and their correlation to driving behavior are stable over time will the topic of a longitudinal evaluation (currently not yet completed), which will provide information about possible traffic safety-related changes in the aging process.

Keywords: Aging, Driving, Traffic Psychology

Presentation type: Poster Presentation

Session: Health and environment

The Effect of Movement Direction on Spatial Frequency Discrimination In Oriented Textures

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Haptic perception is inherently active. Variation of exploratory movement can be utilized in active touch and in turn influences perception. For example, people perceive small shapes more precisely when the finger explores them laterally as compared to anterioposterior, and they tend to adjust the exploratory direction in that task to increase perceptual performance (Drewing, 2012). Here, we investigated how movement direction of the finger affects texture perception and associated movement control. Texture perception is based on spatial cues from static touch and temporal cues from active movement. We used stimuli that maximized the relevancy of movement-related temporal cues: Oriented ridge-groove textures that have high spatial periods > 1 cm and ridge sizes of 0.5 mm, and for that static touch does not provide much information. Also, the textures were always oriented orthogonal to the finger. The finger was moving lateral or anterioposterior to the body. Participants performed a two-interval forced choice task choosing in each trial the stimulus with higher spatial frequency. We used the method of constant stimuli (one standard stimulus, 9 comparisons, step size 1 mm). Participants applied higher force during the exploration process in anteroposterior orientation than in lateral orientation while there was no difference regarding exploration velocity or texture discrimination (JNDs). We speculate that participants modify their forces to increase information gathering in a more difficult anterioposterior condition (cf. Drewing, 2012) and thus optimize the exploration process for texture discrimination.

Keywords: haptic perception, texture perception, spatial frequency discrimination, haptic exploration, finger movement direction

Presentation type: Poster Presentation

Session: Motor and action control

Persistent neurocognitive deficits in sepsis survivors can be explained by reductions in working memory capacity

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Sepsis is defined as life-threatening organ dysfunction caused by a dysregulated host response to infection. Mounting evidence suggests that many sepsis survivors show long-term neurocognitive deficits in neuropsychological tasks. The underlying mechanisms of these cognitive deficits are not well understood. We utilized psychophysical whole and partial report measures based on the theory of visual attention (TVA) to estimate basic parameters of visual attention and working memory in intensive care-treated survivors of sepsis and sociodemographically matched healthy controls. The study goals were to determine i) whether sepsis survivors show changes

in parameters of visual attention and working memory, ii) whether the affected parameters are related to neuropsychological test results in a standard battery, iii) whether between-group differences in these basic parameters of visual attention could account for the underperformance of sepsis survivors in the neuropsychological tests, when adjusting for relevant clinical variables. Results showed a reduction (M = 3.0 for sepsis survivors, M = 3.4 for healthy controls) in working memory capacity parameter K for sepsis survivors. Moreover, K explained variance in neurocognitive outcomes – precisely, attentional and executive functions – in a standard neuropsychological battery. The association remained stable when adjusting for clinical variables, such as anxiety and depression. Thus, a reduction in the number of items to be maintained in a given instant seems to be a critical determinant of the neurocognitive sequelae in sepsis survivors. The working memory storage capacity should be subject of future work on mechanisms but may also serve as surrogate outcome measure in interventions.

Keywords: Sepsis, Neurocognitive Impairment, Visual Attention, Working Memory

Presentation type: Oral presentation / Talk

Session: Advances in TVA-based visual attention research II: Basic and Applied

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Does irrelevant speech increase the susceptibility to experimentally induced false memories?

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It is well known that task-irrelevant speech interferes with the retention of information in short-term memory, in particular when the to-be-remembered information is verbal and when the items are to be recalled in serial order. Much less is known about the effects of irrelevant sound on the interference with information from long-term memory, such as the semantic-associative networks leading to false memories. The aim of the present study is to test whether different types of background speech during encoding of semantically related word lists affect the occurrence of memory intrusions that were induced with the Deese-Roediger-McDermott paradigm. It was found across two experiments (one online and one in the laboratory) that irrelevant speech significantly increased the proportion of false recognitions of critical lures (i.e., words that were semantically associated with the lists), compared to noise or silence. In addition, unexpected sounds within the irrelevant utterances (an acoustical deviant or a taboo word) also affected the recognition of presented words, but there was no further influence on false memories. These results are consistent with attentional accounts of auditory distraction, postulating that any changes in the auditory environment capture attention from the focal task. In the present context, irrelevant speech may have diverted attention from the identity of to-be-remembered words (verbatim traces), thus leading to encoding of gist traces only, which produce false memories for associated words.

Keywords: irrelevant speech effect, auditory distraction, false memories, attentional capture, memory intrusions

Presentation type: Oral presentation / Talk

Session: False information and memory

Project PLan Psy - Developing an evidence-based service for translating psychological science

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Plain Language Summaries (PLSs) summarize research findings for non-expert audiences in an easily understandable manner. At the Leibniz Institute for Psychology (ZPID), project PLan Psy lays the foundation for a service that translates meta-analytic psychological evidence into German PLSs. Contrary to existing science communication approaches, this service will be strictly evidence-based. Here, we will outline the project's experimental approach for developing a guideline for writing PLSs which serves as a basis for an evidence-based science communication service. First, we conducted a systematic review of theoretical and empirical research and guidelines for writing PLSs to derive research questions and research gaps as starting points for experimental studies. As a result, we conducted four preregistered quantitative studies that implemented experimental between-person designs with approximately 2000 participants from the general German population in each study. Qualitative studies complemented this experimental approach. We will illustrate key findings of the project's experimental studies. Experimental studies showed, for example, that laypersons perceived guideline-compliant PLSs as more comprehensible compared to scientific abstracts, and that PLSs that replaced technical terms with everyday terms - rather than retaining technical terms and defining them - facilitated knowledge acquisition. Current steps to transfer these and other project results into a permanent, open service at the ZPID will be outlined. Project outputs that can be re-used by the research community include the evidence-based guideline for writing PLSs, introductory videos for laypersons, and the KLARsaurus, a dictionary of 'translations' for technical terms. Community-based potential for participation and further development are discussed.

Keywords: plain language summaries, science communication, meta-analyses, evidence-based practice; guideline development

Presentation type: Poster Presentation

Session: New media and machine interaction

Take the best in a natural decision setting – Developing an ecologically valid and easy to use paradigm to

access the memory activation dynamics in heuristic decision making

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The take-the-best heuristic (TTB) is an often-used decision strategy that relies on controlled and limited information search, taking only those pieces of information into account that are necessary to come up with a decision. This paradigm has proven to be an extremely valuable tool to investigate the dynamics of memory retrieval when decisions have to be based on stored information. In almost all implementations of TTB, its use is based on artificially constructed stimulus material that has to be learned from scratch. Here, we present a new variant of the TTB paradigm that is ecologically valid and easy to implement, without an extensive learning phase, because the cue knowledge is already known to the participants and just has to be reinstated in a short training phase. Participants were told that they won a flight in a lottery and had to do preference judgments between possible travel destinations based on attributes like their distance from home. In a series of experiments, we consistently replicated the typical finding when using TTB, i.e., a systematic decrease of the decision time the smaller the number of attributes that had to be compared. The paradigm was also capable of reproducing newer findings related to the use of TTB like a systematic RT increase when more attributes are associated to the decision options than actually required for TTB. All in all, our paradigm proved to be a useful and easy to apply experimental tool suited to capture the memory activation dynamics during heuristic decision making.

Keywords: Decision making, heuristics, Long-term memory

Presentation type: Oral presentation / Talk

Session: Decision making

Importance of Omega 3 fatty acids in learning disabilities

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Reading disability is one of the leading problems occurring during childhood. The problem accounts for 5-10% of school-going children. Dyslexic children do suffer from poor sequenced working memory and difficulty in suppressing phonological and visual similarities mainly for alphabets and sometimes even numbers despite average intelligence. Dyslexia prevalence related to heritability is approximately 50% shown by the genetic studies also stating higher percentages in males than females. Studies also report microscopic differences in the neuronal connection and strength in language-dominant areas of dyslexics. A total of 207 articles were reviewed to understand the course of neurodevelopmental disorders from various sources such as web of science,

web of knowledge, google scholar, Scopus and other articles published in valid governmental organizations. After reading the entire article a total of 37 articles were rejected as they were not related to nutrition, children, dyslexia, or neurodevelopmental disorders. The important omega-3 fatty acids are (1) Alpha-linolenic acid (ALA), (2) Eicosapentaenoic acid (EPA), and (3) Docosahexaenoic acid (DHA). Studies also suggest an adequate intake of omega-3 HUFA could reduce the behavioural and learning difficulties mainly linked with attention deficit hyperactive disorder and dyslexia during childhood. Micronutrients such as Vitamin B-12, Zinc, Folic acid, Iodine, and iron are also crucial for the cognitive development of children reported by observational studies. To understand the complete course of reading disabilities and other developmental disorders; importance should be given to dietary habits' also rather than just focusing on behavioural and cognitive interventions to overcome such difficulties during childhood.

Keywords: Dyslexia, language processing, nutrition

Presentation type: Oral presentation / Talk

Session: Learning and models

Academic training increases grounding of scientific concepts in experiential brain systems

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Scientific concepts typically transcendent our sensory experiences. Traditional approaches to science education therefore assume a shift towards amodal or verbal knowledge representations during academic training. Grounded cognition approaches, in contrast, predict a maintenance of grounding of the concepts in experiential brain networks or even an increase. To test these competing approaches, we investigated the semantic content of scientific psychological concepts and identified the corresponding neural circuits using functional magnetic resonance imaging (fMRI) in undergraduate psychology students (beginners) and in graduated psychologists (advanced learners). During fMRI scanning, participants were presented with words denoting scientific psychological concepts within a lexical decision task (e.g., "conditioning", "habituation"). The individual semantic property content of each concept was related to brain activity during abstract concept processing. In both beginners and advanced learners visual and motor properties activated brain regions also involved in perception and action, while mental state properties increased activity in brain regions also recruited by emotional-social scene observation. Only in advanced learners, social constellation properties elicited brain activity overlapping with emotional-social scene observation. In line with grounded cognition approaches, this study demonstrates that, following academic training, abstract scientific concepts show a similar or even an enhanced grounding in experiential brain systems. These results also highlight the importance of experiential information for constituting the meaning of abstract scientific concepts during the course of academic training.

Keywords: grounded cognition, embodied cognition, semantic memory, language, expertise, abstract concepts

Presentation type: Oral presentation / Talk

Session: Embodiment and perspective taking

Self-Initiation Enhances Perceptual Processing of Auditory Stimuli in an Online Experiment

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Understanding how the brain incorporates sensory and motor information will enable better theory building on human perception and behavior. Recent empirical work suggests that sensory attenuation (SA) - the observation that self-generated sensory input is often perceived as less intense than externally generated sensory input - provides a window into predictive processing of the sensory and cognitive apparatus, and thus may allow to study the core mechanisms of human functioning. In this study, we aimed to estimate the magnitude and variability of SA in an online sample using PsychLab Online and the web experiment builder Lab.Js. Participants (N = 230) compared the volume of two consecutive tones in a two-alternative forced choice task. Perceptual processing was manipulated by motor behavior (active versus passive), identity prediction (i.e., the congruency of pre-learned cue-sound combinations; congruent versus incongruent), and a fixed sound offset (to account for effects of attentional differences between the passive and active condition, 50ms versus 0ms). Contrary to our prediction, we observed enhanced perceptual processing, instead of attenuation, for self-initiated auditory sensory input. Further, our results imply a subtle, but reliable impact of multiple factors (i.e. sound offset and according multisensory influences, stimulus volume, stimulus order) on the processing of motor and non-motor-based predictive information - and may point to according shifts in attention, leading to a perceptual bias. Finally, we discuss current challenges in running behavioral studies online and provide technical, as well as practical recommendations.

Keywords: Self-Initiation, Sensory Attenuation, Sensory Enhancement, Online Experiment, Auditory Perception

Presentation type: Oral presentation / Talk

Session: Action-perception interaction

Cognitive tasks to measure individual differences – increased reliability in free choice paradigms?

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Cognitive psychologists develop and use cognitive paradigms to isolate and investigate cognitive functions. For example, the Stroop task is used to investigate the impact of automatic word reading on color naming to understand how irrelevant information facilitates (in congruent trials) or hinders (in incongruent trials) responding. Often, cognitive paradigms have also been used to assess individual differences. Yet, recently Rouder and colleagues (2019) pointed out that the Stroop task and other conflict tasks are not suitable to measure individual differences. In line with this assumption, Schuch and colleagues (2021) found that the reliability of several measures for cognitive control is moderate (for split-half reliabilities) to poor (for retest reliabilities). This seem to at least partly result from small variability of the respective cognitive measure among participants. Here we suggest that free choice paradigms might be suitable to increase inter-individual variability of the respective cognitive measure. In line with this assumption, we compare inter-individual variability and reliability of cognitive measure in forced and free choice task switching settings.

Keywords: free choice, interindividual variability, reliability

Presentation type: Oral presentation / Talk

Session: Current directions in free-choice paradigms I: What we can learn from giving more control to the participant

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Cognitive maps for a 3D world

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Humans can build a mental model (“cognitive map”) of the world. Cognitive maps are useful for physical navigation as well as more general human cognition. Physical space is 3D and abstract space can be higher-dimensional. However, a majority of previous research investigated spatial navigation in a simple flat 2D environment, leaving a 2D Euclidean map as a dominant model in the field. How do humans build cognitive maps for a 3D world where they can move vertically as well as horizontally? How do they navigate on a non-flat surface embedded in the 3D world? Do they use a dimension-reduced map or a volumetric map? Can people overcome the influence of Euclidean geometrical prior? In my talk, I will present virtual reality (VR) experiments which investigated the nature of cognitive maps for 3D volumetric environments and curved surfaces.

Keywords: 3D, non-Euclidean, cognitive map, sphere

Presentation type: Oral presentation / Talk

Session: Spatial Navigation

Examining the anticipatory attentional biases triggered by threatening content related to medical fears

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Processing threatening stimuli is thought to have priority over other types of content. Current studies have shown that neutral stimuli that reliably predict the appearance of threatening content, can elicit anticipatory attentional bias. Using this cued visual probe task (CVPT) paradigm can enhance the reliability of measuring this bias because in this setup the bias is triggered by the category of the content (threat), rather than the individual characteristics of the threatening stimuli used. In the present study, we investigated whether this anticipatory effect occurs to specific, medical fear-related (medical equipment, injuries, blood) stimuli as threatening content using neutral stimuli as predictors. In two experiments, we used two CVPT paradigms with different designs. In Experiment 1 (N=33), pairs of predictive cues, threatening and neutral images, and the probe appeared in a diagonal arrangement on the screen (similarly to the classical dot-probe task). In Experiment 2 (N=51), cues and the content they predicted were presented in the middle of the screen (individually), while the probe was still presented in an off-central position. In both setups, the task was to indicate where the target probe was presented by pressing the corresponding button. In Experiment 3, we used eye-tracking (N=29) to replicate and extend Experiment1 and 2. Participants tended to avoid the location of the predictive stimulus associated with threatening content, resulting in slower (Exp1) and faster (Exp2) reaction times in solving the task. The results of the eye-tracking experiment help to place our results in the context of attentional biases.

Keywords: BII phobia, threat, eye-tracking, attentional avoidence, visual probe task

Presentation type: Oral presentation / Talk

Session: Applied attention

Frontal theta power as an electrophysiological marker of cognitive deficits in depressive patients

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Depression is an affective disorder, which symptoms might often be considered as exclusively mood related. However, most of depressive patients report massive psychological strain because of cognitive deficits, which even last in the remission state.

In the past, the frontal midline theta oscillatory activity in the electroencephalogram (EEG) was associated with cognitive control processes. Therefore, the aim of our study was to examine theta power differences between healthy controls (HC) and patients with major depression (MD) when cognitive control is needed. For this reason, 36 matched participants (each group) performed a verbal Eriksen-Flanker-Task while an EEG was recorded. The preliminary results showed that HC compared to MD patients show a stronger increase of total, evoked and induced theta power comparing the non-conflict trials with the conflict trials. In the HC group, a lower increase of theta power was associated with a stronger flanker effect in reaction time and subclinical depressive symptoms (BDI-II). Furthermore, the theta increase was positively associated with a better performance in other executive control tasks (Go/Nogo-, n-Back-Task) in both examined groups. These results indicate that theta power changes could be a marker for abnormal oscillatory changes in people suffering from MD. HC are able to recruit cognitive control resources more efficiently in the conflicting trials compared to MD patients. These electrophysiological findings support the relevance of considering more seriously the cognitive syndrome in depression.

Keywords: theta power, depression, cognitive deficits, EEG, executive functions, cognitive control

Presentation type: Poster Presentation

Session: Cognitive control and conflict

Better or Worse than Expected? Differential Influence of Motivation on Feedback-Processing

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Monitoring the consequences of our behaviour and processing the feedback from our environment are both important for learning. Since motivation is known to influence a variety of cognitive processes, the current study aims to identify which particular aspects of feedback processing can be influenced by monetary incentives. To this end, participants (target *N*=48) will perform a time estimation task while their electroencephalogram is recorded. To differentiate between expectedness and valence, participants will receive adaptive performance feedback, resulting in infrequent positive and infrequent negative (20%, respectively) as well as frequent neutral feedback (60%). One group will be incentivised for obtaining positive feedback, while the other group will be incentivised for avoiding negative feedback. We will use event-related potentials (FRN, P300) to investigate whether early and late feedback processing is influenced by expectancy, valence, and motivation, respectively. We expect to replicate the finding that the FRN differentiates between expected and unexpected feedback. The FRN might additionally be influenced by motivation as reflected in larger FRNs in the respective incentive condition. We expect the P300 to be sensitive to feedback relevance and, thus, to be influenced by the motivational incentive. Accordingly, we expect to see larger P300 amplitudes for positive feedback in the group instructed to

obtain positive feedback, whereas the group instructed to avoid negative feedback is predicted to elicit larger P300 amplitudes following negative feedback. Investigating the relationship between motivation and feedback processing will allow for a better understanding of feedback-based learning and associated dopaminergic functioning.

Keywords: feedback processing, motivation, feedback related negativity, P300

Presentation type: No-Data Poster

Session:

Formally Testing the Theoretical Pillars of Person Perception

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Forming judgments of other people is one of the most basic and consequential elements of social life, impacting virtually every interpersonal and intergroup interaction. The impressions we make of others comprise the integration of many, often varied, attributes about the person, including cues to their social group membership, traits of their personality we believe them to possess, and characteristics of their behavior we witness. The theories of person perception that explain this integration of attributes have consistently relied upon a core set of claims: a) the processing of certain attributes (e.g., individuating behaviors) are affected by cognitive capacity more than the processing of other attributes (e.g., social categories); b) accuracy and impression management motivations should reduce the use of irrelevant and/or biasing attributes (e.g., social categories cuing stereotypes); and c) attributes are processed in competition, such that greater use of one attribute results in less use of another attribute. However, current measures of person perception have not afforded appropriate tests of these claims. Using a formal modeling approach that avoids previous limitations to measuring person perception, we conduct rigorous tests of all three theoretical pillars to person perception research. Our results contend with those pillars and provide both novel insights to advancing both the measurement and theoretical understanding of social judgments.

Keywords: Impression Formation, Person Perception, Multinomial Process Tree

Presentation type: Oral presentation / Talk

Session: Person perception

The pretesting effect comes to full fruition after longer delays and in the presence of interference

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The pretesting effect refers to the finding that taking a pretest before some target material is studied can enhance recall of that material on a subsequent final test even if participants fail to recall the correct information during pretesting. In the present research, we examined whether the magnitude of the pretesting effect is modulated when either the retention interval prior to the final test is prolonged (Experiment 1) or additional, interfering study material is encountered between study and final testing of the target material (Experiment 2). Employing both weak associates (Experiment 1a) and a prose passage (Experiment 1b) as study material, the present study found that the size of the pretesting effect can increase with retention interval. Furthermore, employing weak associates as study material, the size of the pretesting effect was also found to increase in the presence of additional, interfering material, regardless of whether a low (Experiment 2a) or high (Experiment 2b) degree of learning was induced for the interfering material. Pretesting could thus play a significant role in educational settings where information often needs to be retained over prolonged periods of time or in the presence of competing information.

Keywords: testing effect, pretesting effect, retention interval, interference

Presentation type: Oral presentation / Talk

Session: Benefits of Practice Tests on Learning

Age-related Differences in Face Adaptation Effects on Brightness Information

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Adaptation effects have been observed and investigated for many different facial attributes (see Strobach & Carbon, 2013 for a review) and can be considered as evidence for the plasticity of our perceptual and memory system. However, this evidence in the face adaptation literature is limited to younger adults (YAs). Therefore, 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 from age and does occur in healthy older adults (OAs) as well. Since, among others, the ability to integrate newly acquired information is impaired in OAs (Faubert, 2002) we propose that face adaptation effects are less pronounced in healthy OAs in comparison to YAs. To investigate the face adaptation effect, we refer to studies of Mueller et al. (2021). The authors investigated face adaptation effects for non-configural brightness information. They were able to 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”. We discuss the results of the present study in YAs and OAs in the context of plasticity of the perception and memory system.

Keywords: face adaptation, face perception, face memory, non-configural face information, age effects, ageing, plasticity

Presentation type: Poster Presentation

Session: Visual attention

Examining the neural signatures of stable and flexible control modes: a pre-data poster

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To meet cognitive control demands of everyday life, we must continuously adapt our behavior, balancing cognitive stability and flexibility. According to the control-dilemma framework, stable goal-shielding and flexible goal-shifting control modes entail opposing performance costs and benefits. In a within-subjects design, we aim to induce both control modes by manipulating the frequency of task-switches in a cued task-switching paradigm. A high (75%) task-switch proportion of trial transitions in the shifting condition demands flexible shifting between tasks, whereas a lower proportion (25%) permits a more stable control mode within shielding blocks. In both conditions, we will intersperse identical short “diagnostic” test trial sequences with 50% task-switches, assuming that the contextually induced control modes will persist during these test blocks. In line with the assumption of a performance cost-benefit trade-off between goal-shielding and goal-shifting, we expect higher switch costs and reduced interference costs in the shielding condition, and vice versa in the shifting condition. At a neural level, we aim to obtain fMRI indicators to decode the underlying neural patterns of both control modes, investigating whether the respective states are reflected in more or less stable neural task representations (as indicated by enhanced or reduced decoding accuracy in shielding and shifting blocks, respectively). We predict that the shielding-shifting trade-off will show in the brain signals as more stable task representations and enhanced decoding accuracy in the shielding relative to the shifting condition. Moreover, we will assess whether more stable control modes are also reflected in more stable dynamic whole-brain functional connectivity patterns.

Keywords: cued task-switching, switch proportion, cognitive control, goal-shielding, goal-shifting, fMRI

Presentation type: No-Data Poster

Session:

Experiencing Beauty in Everyday Life

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Beauty surrounds us in many forms every day. We aim to investigate what type of objects frequently elicit experiences of beauty in everyday life, what these experiences feel like and how they differ depending on individual differences (e.g., art expertise). To this end, we will use experience sampling (ESM) asking participants to report on beautiful experiences in their everyday life for 1-2 weeks. We will use a mixed random (~ 15 times per day) and event-contingent sampling schedule through participants' smartphones, prompting them to first take a photo or describe what they are currently seeing and to then rate its beauty. Lastly, valence and arousal measures will give insight into the quality and immediate emotional effect of everyday life encounters with beauty. Information on demographics and art expertise (VAIAK, Specker et al., 2020) will be collected in a pre-ESM lab session. We expect non-manmade objects to elicit aesthetic episodes more frequently than man-made objects. Further, we expect this to be influenced by individual differences such as art expertise. How frequently different object categories evoke aesthetic episodes and how this is related to art expertise will be teste using chi²-tests. Further, multi-level modelling will be employed to explore how the quality of aesthetic experiences relates to different object categories and potentially different levels of art expertise.

Keywords: aesthetics, everyday life, experience sampling, beauty

Presentation type: No-Data Poster

Session:

Bidirectional dopaminergic intervention reduces exaggerated cingulate prediction error signal in OCD

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Patients with obsessive-compulsive disorder (OCD) show exaggerated error responses and prediction error learning signals, with data converging on the anterior cingulate cortex as a key locus of dysfunction. Considerable evidence has linked prediction error processing to dopaminergic function. We therefore investigated potential dopaminergic dysfunction during reward processing in OCD. During a fMRI-task, OCD patients (n=18) and controls (n=18) learned probabilistic associations between abstract stimuli and monetary rewards. On separate visits, participants were administered a dopamine receptor agonist, pramipexole 0.5mg; a dopamine receptor antagonist, amisulpride 400mg; and a placebo, while completing the task. We fitted a Q-learning computational model to fMRI prediction error responses; with regions of interest in the anterior cingulate and nucleus accumbens. There were no effects in the number of correct

choices; but computational modelling suggested marginal difference in learning rates between groups. The imaging results revealed that OCD patients showed abnormally strong cingulate signalling of prediction errors during omission of an expected reward, with unexpected reduction by both pramipexole and amisulpride. Furthermore, exaggerated cingulate prediction error signalling to omitted reward in placebo was related to trait subjective difficulty in self-regulating behaviour in OCD. Our data support cingulate dysfunction during reward processing in OCD, and bidirectional remediation by dopaminergic modulation, suggesting that exaggerated cingulate error signals in OCD may be of dopaminergic origin. The results help to illuminate the mechanisms through which dopamine receptor antagonists achieve therapeutic benefit in OCD. Further research is needed to disentangle the different functions of dopamine receptor agonists and antagonists during cingulate activation.

Keywords: Anterior cingulate, Computational model, Nucleus accumbens, Obsessive-compulsive disorder, Prediction error, Reward learning

Presentation type: Oral presentation / Talk

Session: Computational psychiatry: Identifying the fine-grained behavioural mechanisms underlying symptoms in psychosis and internalising disorders

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The influence of loudness on the processing of visually presented numbers

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Several theories suggest the existence of a generalized magnitude representation system for various magnitude dimensions (e.g. A Theory of Magnitude, Walsh, 2003). Furthermore, prior studies indicate an association between magnitudes like numbers and the auditory intensity dimension loudness (e.g. Hartmann & Mast, 2017). If loudness is also represented on a generalized magnitude representation system, loudness should influence the processing of other magnitudes even if they are presented in a non-auditory modality. To investigate this assumption, we tested the influence of loudness on the processing of visually presented numbers in two experiments (online, N = 33 and a lab-based replication, N = 27). In each trial of both experiments, participants saw a single number and they had to decide whether the presented number was smaller or larger than five by pressing a left-sided or right-sided response key. Simultaneously with the presentation of the number, participants heard a tone which could be either loud or soft. We found a significant congruency effect with faster reaction times in congruent conditions (large number and loud tone or small number and soft tone) in comparison to incongruent conditions in both experiments. There was also a significant interaction between loudness level and the numerical distance between the presented number and the standard five in the online experiment but not in the lab-based experiment. We will present possible explanations for this difference and discuss the results' implications for an assumed generalized magnitude representation of loudness.

Keywords: ATOM, magnitude, number processing, loudness

Presentation type: Oral presentation / Talk

Session: Number processing

Examining language dominance effects on bilingual inhibition using three languages

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Speaking two or more languages shows remarkable bilingual flexibility. Yet flexible switching between languages often incur performance costs, suggesting competition among the currently activated languages. Here, we investigated language competition using three languages (L1, L2, L3; German, English, French), taking n-2 repetition costs as a marker for persisting inhibition. These costs denote the finding that performance is worse in n-2 repetition sequences (e.g., ABA) than in n-2 non-repetitions (CBA), suggesting persisting inhibition of switched-away languages. Two experiments tested if inhibition is influenced by the relative dominance of the currently competing language. Experiment 1 (n = 28) showed n-2 repetition costs only for L2 (English). Looking into L2 trials specifically, we found n-2 repetition costs only when switching back to L2 from the still weaker L3 (French) but not when returning from the stronger L1 (German). Experiment 2 successfully replicated this specific pattern with a larger sample (n = 44). Because L1 produced the best performance overall, consistent with always being the relatively most dominant language, finding no specific n-2 repetition costs for L1 may be due to strong general inhibition of L1 in all trials (i.e., L1 would get inhibited even when switching between the two non-dominant languages, so that L3-L2-L1 sequences would not lead to weaker L1 inhibition than L1-L2-L1 sequences). Yet, the focused analysis of L2 trials is consistent with the theoretically assumed relation between language dominance and language inhibition, suggesting that L2 is a strong competitor (requiring inhibition) for L3 but less so for L1.

Keywords: Bilingualism, cognitive flexibility, language switching, language inhibition, n-2 language repetition costs, language dominance

Presentation type: Oral presentation / Talk

Session: Memory, Speech and language processing

Differences of arousal and valence between encoding and recollection affects face recognition speed

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Recognition accuracy of faces can be influenced by stimulating a specific part of the face-space with congruent or incongruent stimuli. For instance, visual stimuli can be used, which can differ in their affective contents. In two studies (N=50) we intended to reveal the effect of congruence on recognition speed and eye movements. We used a force-choice test combined with a go-nogo task. In the first experiment only incongruence in arousal enhanced the time necessary for recognition, incongruence in valence had no effect. However, semantic information from the images might have played some role. In contrast, in the second experiment where semantic information were excluded, incongruence of both arousal and valence decreased recognition speed, but only when the original valence were low, that is unpleasant primes in the learning phase were substituted pleasant ones in the test phase. Differences in fixation times between the familiar (i. e., target) and unfamiliar faces were the same in each condition in both studies. This confirms the assumption that the affective content of visual stimuli activate a specific region of the face-space, which puts a cognitive load on recognition. This is in line with the notion of the dual-pathway processing of faces: the activation of the affective pathway is crucial. Nevertheless, both arousal and valence seems to be influential. The lack of difference between eye-movements across conditions suggests that incongruence effects are caused by pre-conscious integrations of information rather than attentional or encoding processes.

Keywords: face perception, affective information, social cognition, eye tracking, reaction time

Presentation type: Oral presentation / Talk

Session: Person perception

The Influence of Cognitive Demands on Balance Control Extends the View of Shared Resources Using an Event-Related Methodology

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Cognitive-motor interference has been investigated for both, the influence of balance control demands on performance in cognitive tasks and for the influence of cognitive task demands on balance control. Traditional approaches, using posturography aggregated balance control measures over relatively long time periods (e.g., minutes), do not differentiate the role of specific cognitive processes at the balance level. Recent studies using an event-related methodology found that response conflict (i.e., the congruency effect in a Simon task) in a concurrent reaction time task lead to reduced short-term variability of balance control. Here, we combined a balance task with a cognitive dual-task paradigm. This dual task consisted of a visual short-term memory

task requiring a deferred verbal response and an auditory-manual reaction (RT) task, with variable stimulus-onset asynchrony (SOA). With short SOA, we found longer RT ("response bottleneck" effect) and increased variability in the balance control domain. Moreover, compared to single-task conditions (RT task without memory task), we also found longer RT (dual-task effect) and increased balance control variability in the dual task. We assume that manual response postponement (SOA effect) and the general costs of maintaining more than one task set may lower the accuracy balance control, such overshooting an intended balance state. In contrast, reduced sway variability by response conflict in the Simon task (congruency effect) suggests that code-specific response crosstalk may briefly suppresses balance control as the consequence of a balance control "micro-bottleneck". Using the current event-related approach can help to better specify the cognitive-motor interference effects in balance control.

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

Presentation type: Poster Presentation

Session: Motor and action control

One unit or just fragments? Repeating a component of an event file does not retrieve all previous information

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According to action control theories, all features of a stimulus - even if completely task-irrelevant - and the response given to it are temporarily stored in so-called event files. The renewed presentation of any part of it is thought to lead to the retrieval of the entire event file, affecting performance. The aim of the present study was to see whether repeating a component of the event file really retrieves the whole previous event. In the current study, a prime-probe paradigm was used, in which the targets could repeat or change their form (response-relevant feature) and they were interspersed with either vertical or horizontal stripes (response-irrelevant feature). In addition, stimuli were presented in different colors. A colored fixation cross was presented shortly before the probe display. Crucially, the target in the prime display and the fixation cross could appear in the same or a different color. We hypothesized that repeating the prime color in the fixation cross would start retrieval of the prime event. There was a significant binding effect between response and orientation of stripes; additionally, a significant interaction between response and fixation prime congruency suggested that fixation color retrieved the prime response. Yet, the three-way interaction of the factors response, orientation of stripes, and fixation prime congruency was not significant. The results are in line with the idea of binary bindings, but also allow to suggest the potential existence of two distinct retrieval processes working in parallel.

Keywords: action control, perception, distractor-response binding, retrieval

Presentation type: Poster Presentation

Session: Stimulus-response and response-effect binding

Binding Music: Integration of two-tone chords into event files

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The ability to perceive an object as one coherent representation is due to binding processes between its features. Empirically, such binding processes can be measured via partial repetition costs, a performance pattern of faster reaction times when either all features of a given object repeat or switch as compared to the repetition (or switch) of only one feature. Feature binding has been shown for a large number of features in the visual and auditory domain. The purpose of the present two experiments was to investigate whether such binding effects can also be found in the domain of music. More precisely, we aimed to examine whether the tones of a two-tone chord are temporarily integrated into a music event-file. In the first experiment, we applied a pitch classification task. The auditory stimulus consisted of two simultaneous tones (one out of two upper tones of different pitch, and one out of two lower tones of different pitch). Participants responded with a left or right keypress to the pitch of the upper tone. The two-tone chord was always consonant. The lower tone was irrelevant but could also be low or high. Analyses of reaction times and error rates revealed partial repetition costs indicating binding: performance was better when both tones repeated or alternated relative to partial repetitions (only the upper or the lower tone repeated). The results thus show that two consonant tones are integrated into one event-file. In a second experiment, we found that this also holds true for dissonant harmonies.

Keywords: feature-binding, partial-repetition costs, music perception, binding and retrieval, action control

Presentation type: Oral presentation / Talk

Session: Recent advances in binding and retrieval in action control I: Learning, task switching, music, and neural correlates

The animacy advantage in memory is robust against manipulations of richness of encoding

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The animacy advantage in memory refers to the robust finding that words representing animate beings are better remembered than words representing inanimate objects. The

animacy effect is well explained in terms of its evolutionary functions, but the underlying cognitive mechanisms have remained elusive. The richness-of-encoding account implies that animate words stimulate participants to generate more ideas than inanimate words at encoding. These ideas may later still be available as retrieval cues that enhance recall. As yet, there is only correlational evidence associating the animacy advantage with rich encoding. If rich encoding causes the animacy advantage in memory, it should be possible to show that the animacy effect can be modulated by facilitating or suppressing rich encoding. In Experiment 1, we manipulated richness of encoding by asking participants to generate four ideas or one idea in response to animate and inanimate words. In Experiment 2, the one-idea-generation condition was compared to a condition in which participants generated an unrestricted number of ideas. In Experiment 3, the unrestricted-idea-generation condition was contrasted with a distractor-task condition in which idea generation was suppressed because participants solved math problems. Across all experiments, mnemonic benefits of animacy and rich encoding were replicated. However, none of the manipulations of richness of encoding modulated the animacy effect. These findings suggest that the animacy advantage in memory is not caused by richer encoding of animate in comparison to inanimate words.

Keywords: animacy advantage, adaptive memory, richness of encoding, levels of processing, elaborative encoding

Presentation type: Oral presentation / Talk

Session: Learning and encoding

Compatibility Effects With Simple Lever Tools: A Replication and Extension Beyond Simple Button Responses

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When using simple levers, moving the to-be-controlled tip of the lever away or towards a target involves three different compatibility relationships: First, compatibility between the position of a stimulus and hand movement (i.e., stimulus-response [SR] compatibility). Second, compatibility between the position of the stimulus and the movement of the effective part of the tool (i.e., stimulus-effect [SE] compatibility). Third, compatibility between hand movement and the movement of the effective part of the tool (i.e., response-effect [RE] compatibility). An important question in this context concerns the importance of and potential interactions between each compatibility type. By using certain levers (i.e., “u-shaped” and “inverted-u-shaped” levers), and by letting participants either approach or avoid targets, Müsseler and Skottke (2011, Human Factors) tackled this question. They concluded that, with RE compatible tools, a compatible SR relationship is only beneficial when the SE relationship is compatible as well. When the SE relationship is incompatible, the incompatible SR relationship performs better than the compatible SR relationship. This interaction, however, was

absent with a lever that involves an incompatible RE relationship. The present study first replicates the original study, as the original experiment employed a rather small sample of n = 10 with simple button presses. We present the results of our replication and further present and discuss experiments investigating the role of control input (e.g., by investigating continuous lever movements or touchless gestures).

Keywords: compatibility effects, human factors, lever movement, replication

Presentation type: Poster Presentation

Session: Cognitive control and conflict

Multisensory cues for walking in virtual reality: Humans combine conflicting visual and self-motion information to reproduce distances

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When humans walk, it is important for them to have some measure of the distance they have travelled. Typically, many cues from different modalities are available, as humans perceive both the environment around them (for example, through vision and haptics) and their own walking. Here, we investigate the contribution of visual cues and non-visual self-motion cues to distance reproduction when walking on a treadmill through a virtual environment by separately manipulating the speed of a treadmill belt and of the virtual environment. Using mobile eye tracking, we also investigate how our participants sampled the visual information through gaze. We show that -- as predicted -- both modalities affected how participants (N = 28) reproduced a distance. Participants weighed self-motion cues more strongly than visual cues, corresponding also to their respective reliabilities, but with some inter-individual variability. Those who looked more towards those parts of the visual scene that contained cues to speed and distance tended also to weigh visual information more strongly, although participants generally directed their gaze towards visually informative areas of the scene less than expected. As measured by motion capture, participants adjusted their gait patterns to the treadmill speed but not to walked distance. In sum, we show in a naturalistic virtual environment how humans use different sensory modalities when reproducing distances, and how the use of these cues differs between participants and depends on information sampling.

Keywords: locomotion, perception and action, eye movements, distance perception, virtual reality

Presentation type: Oral presentation / Talk

Session: Action-perception interaction

Valence Sound Symbolism: Generalizations and Processes

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Vowels are associated with valence. Specifically, pseudo-words containing /i/ (vs. /o/ and /u/) are more frequently judged fitting to denote positive (vs. negative) objects and people. In addition, novel names invented for positive (vs. negative) objects and people contain more /i/s and fewer /o/s. The present talk presents studies that demonstrate generalizations compared to previous research on this phenomenon, valence sound symbolism, and studies on the psychological mechanism that drive valence sound symbolism. Concerning the generalizations, we demonstrate that valence sound symbolism generalizes to real first names. Specifically, participants were shown faces that differed in valence (either by being high or low in likability, Experiment 2, or by having a positive or negative emotional expression, Experiment 1) and were asked to select a fitting name for this person from their memory of first names. We found that first names for positive (vs. negative) faces contained more /i/s. However, contrary to our hypothesis, participants did not use significantly more /o/s for negative (vs. positive) faces. Concerning the psychological mechanism driving valence sound symbolism, we examined /y/ (as in German über) which pits an auditory against an articulatory explanation of valence sound symbolism. We found that /y/ was associated rather with negative valence (similar to /o/), which fits with a motor mechanism of valence sound symbolism. Specifically, valence sound symbolism might be driven by overlapping muscle tension for emotional expressions and vowel articulation, so that vowels articulated with retracted lips are associated with more positive valence than rounded vowels.

Keywords: sound symbolism, iconicity, language, valence

Presentation type: Oral presentation / Talk

Session: Sound Symbolism: Phenomena, Methods, and Psychological Processes

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The Self from the past seems like a friend: comparison between oneself and close-other, a neuroscience perspective

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The concept of Self has inspired philosophers for thousands of years, yet, we still know very little of its emergence in our minds and brains. Every one of us has the crucial feeling of being oneself and although the changes in life occur, the feeling of oneself remains. This continuity of self-concept in time is rarely investigated with brain imaging techniques. In the talk, I will discuss the neural underpinnings of the processes that build our continuous sense of the self. Electrophysiological studies will be presented, suggesting that neural mechanisms underlying processing the information related to the past self are comparable to processing the information regarding closely-related others. The study of own-name and own-face detection revealed higher brain activity in response to the self than to famous and unknown name/face. The second study of trait adjectives evaluation showed increased brain activity to the self than to a famous person. Both studies bring a meaningful insight into the relation between past-self and close-other comparison: although the present self differs significantly from the close-other, the past-self does not. The results are discussed in the framework of extended self and incorporating closely-related others into one's self-concept.

Keywords: self, EEG, own-name, own-face, adjective evaluation, P3, theta.

Presentation type: Oral presentation / Talk

Session: The relative self: Social comparison and its implications for cognition, well-being and self-construal

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A connectionist architecture of visuospatial working memory

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We present a connectionist model of visuospatial working memory (WM). The core WM architecture encodes new information by binding it to contexts through Hebbian learning. The representations encoded by the model are 2-dimensional spatial locations. These representations were created using the internal pattern of activation from an auto-encoder that learns to reproduce its input. We simulated an experiment in which the model must encode locations of varying proximity presented sequentially, followed by order reconstruction and recall tests. The model generates two important predictions. First, spatial proximity impairs memory for order: In an order reconstruction test, WM representation of spatially closer locations are more difficult to discriminate, leading to increased confusion errors. Second, spatial proximity improves memory for items: In a recall task, the recall error (Euclidean distance) is smaller in sequences composed of spatially close locations. We tested the model's predictions against data from 30 subjects who were asked to perform the same task as the model. The two predictions from the model were confirmed. We propose that similarity effects in WM are governed by domain-general principles, as equivalent observations have been

established for other dimensions of similarity, such as the auditory, visual, and phonological similarity.

Keywords: Modeling, Connectionism, Working memory, Visuospatial

Presentation type: Oral presentation / Talk

Session: Computational Approaches to Modeling Cognition

Keeping eye fixations supports spatial cognitive control

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Cognitive control enables humans to act according to goals by solving conflicts between goals and external stimuli (Cohen, 2017; Koechlin et al., 2003). Conflicts between the location of a stimulus and its symbolic meaning can be ameliorated or exacerbated by spatial attention, the mechanisms prioritizing certain locations for visual processing. Maintaining eye fixations also seems to involve spatial attention. However, it is still unclear, how holding a fixation affects the resolution of spatial cognitive conflicts. In two experiments, participants performed a spatial cognitive control task (Spatial Stroop Task; Clark & Brownell, 1975; Funes et al., 2010) either without instructions regarding their eye movements or with instructions to fixate a stimulus in the center of the screen and suppress eye movements to the target stimulus. In the second experiment, the task was extended by an urgency paradigm (time pressure; Poth, 2020; Salinas et al., 2019). In the first experiment, an interaction between the congruency and the fixation condition was found. The results suggest that tying up attention and cognitive capacities by holding a fixation does not impact general performance, but improves the resolution of spatial cognitive conflicts. In the second experiment, we found that adverse effects of urgency on the resolution of spatial cognitive conflicts were ameliorated by the additional task to maintain an eye fixation. Taken together, keeping eye fixations supports cognitive control for spatial conflicts. When attentional resources are bound by holding a fixation, this facilitates the resolution of spatial cognitive conflicts.

Keywords: Eye Fixation, Cognitive Control, Spatial Attention, Urgency

Presentation type: Poster Presentation

Session: Cognitive control and conflict

Interpretation of Non-Canonical Pointing Gestures

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Research on the interpretation of pointing gestures mainly focusses on canonical gestures in which the pointing arm and hand are extended in a straight line. However, other arm-hand configurations may be used, for example by bending the wrist when the referent is occluded. We hypothesized that even though the extrapolation of the index finger is crucial, the arm nevertheless affects the interpretation. Two effects are conceivable. First, the arm is perceived as additional direction cue and thus integrated into the interpretation. Consequently, the hand's extrapolation is biased towards the arm direction (assimilation effect). Second, the arm may be considered as context cue from which the perceived hand orientation is repulsed (contrast effect). To decide between both possibilities, we conducted two online experiments. Observers judged where a pointer was pointing at. The pointer's arm and hand orientation were independently manipulated as well as the distance between pointer and target. As expected, interpretations were mainly based on the index finger orientation. Additionally, the interpretation was biased away from the arm orientation (contrast effect). Moreover, observers interpreted canonical gestures more linearly compared to non-canonical ones. A follow-up experiment replicated the overall data pattern and revealed that the increased linearity in canonical gestures cannot be traced back to an easier extrapolation of a generally larger stimulus.

Keywords: Visual Perception, Pointing Gestures, Pointing Perception, Gesture Interpretation

Presentation type: Oral presentation / Talk

Session: Action-perception interaction

Real-World Estimation Taps Into Basic Numeric Abilities

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Estimating unknown quantities is an important task that we are repeatedly confronted with in our everyday lives (e.g., costs of groceries). Often, we have to estimate quantities that range in the hundred-thousands to billions (e.g., property prices, governmental budgets)—although we have only little practical experience in this range. Which psychological factors are involved in accurately estimating quantities in such high ranges? To date, research on real-world estimation has mainly focused on the role of domain knowledge (Brown, 2002; Brown & Siegler, 1993); the role of more basic numeric abilities, such as numeric representation—which has been shown to contribute to performance in numeric memory and preferential choice (Peters & Bjalkebring, 2015; Schley & Peters, 2014)—has not been investigated yet. To examine the extent to which basic numeric representation (i.e., the ability to accurately map quantities of different magnitudes in relation to each other) is associated with real-world estimation of large numbers, we conducted an online study with N = 284 participants. They first estimated the populations of 32 countries; then they completed a number line task, in which they

had to indicate where a number is located on a line (Siegler & Opfer, 2003). The results indicated that a higher estimation accuracy of country populations was indeed associated with higher accuracy in the number line task. Thus, we show for the first time that real-world estimation of large numbers taps into basic numeric representation. The results might help design interventions to improve real-world estimations for large numbers.

Keywords: real-world estimation, quantitiative estimation, large numbers, numeric representation, number line task

Presentation type: Oral presentation / Talk

Session: Number processing

Frequency-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 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. Recently, Wang et al. (2014) 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 explore this idea, we investigated whether the auditory Ternus effect is also dependent on the stimulus features by creating a bias based on frequency. 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 frequency bias, suggesting that both domains might use the same mechanism to connect objects across space and time.

Keywords: apparent motion, auditory perception, correspondence problem

Presentation type: Poster Presentation

Session: Auditory processing

Peripheral duration estimation: No difference between saccade inhibition and execution

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The duration of peripheral stimuli is underestimated compared to stimuli presented closer to fixation. In these studies participants were instructed to constantly direct their gaze on a central fixation cross. Yet, the presentation of peripheral stimuli elicits saccadic eye movements which which had to be inhibited. A number of studies show that the execution of saccadic eye movements during stimulus presentation shortens perceived duration. Further, the perceived timing of a stimulus that triggers a saccadic eye movement is distorted compared to the timing of a stimulus that is observed passively. In the present study we investigated how the execution compared to the inhibition of a saccadic eye movement towards a peripheral stimulus location affects its perceived duration. In a temporal bisection task, participants categorized black discs with varying duration (20-220 ms) presented in 6° or 12° of eccentricity as either short or long. Additionally, subjects were either instructed to fixate the screen center or perform saccades to the peripheral stimulus location in a block-wise manner with blocks counterbalanced between participants. The effect of eccentricity was replicated: Stimuli at 12° were perceived as shorter compared to stimuli at 6°. Overall, saccade inhibition versus saccade execution did not differentially affect duration estimation. Except when considering block order: Descriptively, the eccentricity effect was larger in the saccade condition when the saccade condition was performed after the fixation condition. No effect of block order was found when the saccade condition was performed first. We discuss the results in the context of reference effects.

Keywords: duration estimation, time perception, eye movements

Presentation type: Oral presentation / Talk

Session: Spatial and temporal perception

Is it a match? Overall person attractiveness judgements of video and audio recordings as potential predictors of person attractiveness judgements online and in real life.

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Research has found evidence for audiovisual integration in several fields related to human social interactions, including speech, identity recognition, and emotion

recognition. Surprisingly, few studies have examined audiovisual integration of attractiveness judgments. Are judgements based on sound (i.e., voices) and judgements based on visual information (i.e., faces) combined when assessing overall person attractiveness? If so, what is the predictive value of each modality? We defined several possible outcomes: a) one modality is the better predictor, b) overall attractiveness results from an integrative process of both modalities, or c) overall attractiveness cannot be modelled by any of the modalities. To address this question, we conducted an online experiment (Study 1) using standardized video material recorded under controlled conditions; and a field study (Study 2) using participant-created video material and real-life interactions. In both studies, participants first judged person attractiveness based on information from either audio recordings or muted video recordings, and second based on information from an audiovisual video (i.e., voice and face) in an online experiment. Additionally, Study 2 included a speed-dating event where participants met a subset of the individuals they previously rated. Here they interacted with each other for 4 minutes and judged person attractiveness again, using all information available from a real-life interaction. Together, these studies clarify the relative contributions of faces and voices to person attractiveness judgements and, furthermore, allow us to compare results from online experiences with real life encounters. First results are presented.

Keywords: audiovisual integration, multimodal attractiveness, voice, face, speed-dating

Presentation type: Oral presentation / Talk

Session: Person perception

Forward effect of testing in visuospatial learning: On the role of proactive interference

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Retrieval practice can enhance learning of newly studied information. In two experiments, we investigated this forward testing effect in learning of spatial information, that is, arrays filled with objects; participants were instructed to memorize the objects' locations in four learning blocks. We tested the hypothesis that retrieval practice reduces proactive interference (PI) and thereby enhances the learning and retention of objects' locations in the final array. To test this hypothesis, we employed a two-factorial mixed design, with practice type (retrieval vs. restudy) being a within-subject factor and PI (matrices with same vs. different objects across learning blocks) being a between-subjects factor. In each of two sessions, participants studied arrays (Exp. 1: 3 × 3 objects; Exp. 2: 4 × 4 objects) either filled with the same objects but in different locational arrangements (i.e., high PI) or with different pictures in the four learning blocks (i.e., low PI). In Learning Blocks 1–3, participants received either an interim test after each array (retrieval practice) or were asked to restudy the array (restudy practice). In Learning Block 4, all participants were tested on the final array. Consistent in both experiments,

retrieval practice led to a better location performance in Learning Block 4, compared to restudy practice, and the forward effect of testing was higher in the context of high, compared to, low PI. Furthermore, retrieval practice reduced the number of confusion errors in Learning Block 4.Thus, retrieval practice enhances subsequent learning of locational information by partially reducing PI from previously learned arrays.

Keywords: forward testing effect, test-potentiated new learning, visuospatial learning, proactive interference

Presentation type: Oral presentation / Talk

Session: Benefits of Practice Tests on Learning

Partner-elicited semantic facilitation in an online cooperative joint picture classification task

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Language is foremost an instrument for social interaction. In social interaction, interaction partners have been shown to represent not only their own action but also the action of their partner. Such partner co-representation is typically demonstrated by interference between own and partner action. Yet a partner's action may also facilitate own action. To investigate this we measured the speed with which speakers can classify objects presented on pictures as "natural" or "manufactured". In single-subject settings, response times have been shown to decrease with each picture classified within a given semantic category. Here we investigate such cumulative facilitation in a joint task setting in which two task partners take turns classifying pictures. We expect a decrease in response times with each additional member of a given semantic category (cumulative semantic facilitation) and a stronger decrease for semantic categories that are classified jointly by participants and task-partners compared to categories classified solely by participants (partner-elicited semantic facilitation). This would demonstrate that a partner's actions are represented and in turn can facilitate own action. The shared task was implemented in an online setting in which participants were led to believe they were collaborating with a task partner. To emphasize the joint nature of the task, it was framed as cooperative by informing participants that their own and their partner's performance would be pooled and compared to other participant pairs. Our results will be discussed with regard to the conditions under which partner co-representations occur and with regard to the nature of these representations.

Keywords: Language, semantic context effects, joint action, social interaction

Presentation type: Oral presentation / Talk

Session: Tell me and talk to me – the influence of language on goal-directed performance

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Enhancing Creativity through Ambient Light Feedback

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The ability to be creative is becoming increasingly important. Collecting ideas in groups could be especially beneficial if members inspire each other, but evidence shows that during brainstorming, groups collect fewer ideas than members individually. Synchronous feedback on statements might improve creativity in groups. Accordingly, a feedback-interface (Group Mirror) to improve group creativity was developed. Since attention is particularly occupied during brainstorming, an ambient light form of representation was chosen, which aims to take up as little attention as possible. Behavior was either reinforced (green light) or inhibited (red light) based on AIFI ("Analyzing Idea Finding Interactions") live coding system. To investigate the effects of the ambient light feedback, a between-subjects design was conducted comparing the four levels of "ambient light," "ambient light - false feedback," "diagram-based," and "no feedback." In the case of false feedback, facilitative statements were inhibited, and inhibitory statements were reinforced in order to test whether the specific feedback was actually effective. A diagram-based presentation should require more attention and was therefore included as a comparison group. A total of 96 subjects participated in 32 groups of three members each. Creativity was measured using the number of ideas per group. In addition, exploratory data were collected using a questionnaire and a short group interview. Correct ambient light feedback improved the group's creativity compared to no feedback and diagram-based representation. Additionally, conversational behavior differed by condition, particularly in the second half of the conversation. Ambient light feedback thus provides a good method to improve creativity in groups.

Keywords: ambient light, feedback, brainstorming, creativity

Presentation type: Poster Presentation

Session: Moral decisions and social interaction

Space-valence mapping of social concepts: Do we arrange ethnic stereotypes from left to right?

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The body-specificity hypothesis states that in right-handers, positive concepts are associated with the right side and negative concepts with the left side of the body. Our study postulated that negative out-group ethnic stereotypes would be associated with the left side, and positive in-group stereotypes would be associated with the right side. The experiment consisted of two parts. First, we measured the spatial mapping of ethnic

stereotypes by using a sensibility judgment task, in which participants decided whether a sentence was sensible or not by pressing either a left or a right key. The sentences included German vs. Arabic proper names. Second, we measured implicit ethnic stereotypes in the same participants using the Go/No-go Association Task (GNAT), in which Arabic vs. German proper names were presented in combination with positive vs. negative adjectives. Right-handed German native speakers (N = 92) participated in an online study. As predicted, in the GNAT, participants reacted faster to German names combined with positive adjectives and to Arabic names combined with negative adjectives, thus demonstrating valenced in- and out-group ethnic stereotypes. However, we failed to find any reliable effects in the sentence-verification task, i.e., there was no evidence of spatial mapping of ethnic stereotypes. There was no correlation between the results of the two tasks at the individual level. Further Bayesian and exploratory analyses in the left-handed subsample (N = 9) corroborated the evidence in favor of null results. Our study suggests that ethnic stereotypes are not automatically mapped in a body-specific manner.

Keywords: body-specificity hypothesis, embodied cognition, ethnic stereotypes, implicit associations, GNAT, out-group stereotypes, space-valence associations

Presentation type: Oral presentation / Talk

Session: Cross-dimensional compatibility effects between quantities, valence and space: Points of convergence and points of divergence

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A replication of Amodio, 2007, 2008: Correlates of cognitive control, political attitude and BIS/BAS

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Through the project #EEG ManyLabs a international researcher group is attempting to replicate influential EEG studies. Two of these studies are Amodio et al. 2007 and 2008. We try to replicate their findings that political liberalism and conservatism is reflected in different outcomes in a Go-NoGo task (Amodio et al., 2007) as well as the correlation between the behavioural inhibition (BIS) and activation system (BAS) and the outcomes in the same Go-NoGo task. To clarify the relationship between cognitive control processes and political attitude and BIS/BAS, we exactly replicated the methodology used by Amodio et al. We furthermore extended the amount of questionaires used in the original studies to clarify the underlying factors of political attitudes and the BIS/BAS. The first replication attempt is purely behavioural. We expect more politically conservative people to make more NoGo errors due to their cognitive rigidity. Furthermore the behavioural inhibition system should relate to less errors in response to NoGo trials and the behavioural acitvation system to quicker response times.

Keywords: cognitive control, Go-NoGo paradigm, political attitude, behavioural inhibition system, behavioural activation system

Presentation type: Oral presentation / Talk

Session: Implicit testing

The role of stimulus-response translation automaticity in concurrent action execution and inhibition

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Executing a single action (e.g., a manual button press) while concurrently inhibiting another, prepotent action (e.g., a saccade) typically results in frequent false-positive executions of the latter action. Executing both actions together does not require inhibitory control and can thus be less error-prone, creating a relative dual-action performance benefit. We here examined the effect of stimulus-response (S-R) translation automaticity on the frequency of false-positive errors in single-action trials and accuracy-based dual-action benefits. Based on a color cue, participants responded with either a single saccade, a single manual button press, or both actions together to a single visual target stimulus. Stimulus type was varied between blocks with decreasing translation automaticity into a spatial (left vs. right) response (peripheral square > central arrow > arbitrary central shape). This order was reflected by a corresponding increase in correct RTs. False-positive errors in single-action trials indicative of inhibition failures were less frequent in the central arrow condition compared to the peripheral square condition. Inhibition failures were most frequent in the arbitrary central shape condition, however, so were overall error rates. The relative dual-action benefit thus decreased as a function of S-R translation automaticity. These results suggest better inhibitory control of a prepotent action when a concurrently executed action takes longer (vs. shorter) to be specified. However, this only holds when specification is not overly difficult.

Keywords: dual-task, multiple action control, inhibition, s-r translation, eye movements

Presentation type: Poster Presentation

Session: Stimulus-response and response-effect binding

Dissociating sub-processes of aftereffects of completed intentions and costs to the ongoing task in prospective memory: A mouse-tracking approach

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Prospective memory enables us to pursue intentions and remember to perform intended actions in the future. While previous research has established that pursuing intentions can incur costs in ongoing task performance and completing intentions can incur aftereffects due to continued intention retrieval, the underlying processes of these effects are a subject of debate. Here, we used mouse-movement tracking to (A) Investigate the involvement of reflexive-associative and discrepancy-plus-search processes in the retrieval of completed intentions. (B) Test whether ongoing-task costs during intention pursuit are associated with strategic monitoring processes or with a strategic delay of ongoing-task responses. (C) Probe the potential interaction of processes underlying ongoing-task costs and processes and retrieval of completed intentions. First, our analyses of mouse-movement data suggest that aftereffects of completed intentions can best be explained by a reflexive initiation of the completed intention, which is followed by a subsequent movement correction that we interpret as a time-consuming response-verification process. Regarding ongoing-task costs, we found that actively pursuing an intention most likely leads to a strategic delay of ongoing-task responses. Lastly, we found evidence for an interaction of these processes: Pursuing a novel intention after intention completion exacerbated orienting responses to deviant stimuli, increased the readiness to reflexively initiate the completed intention and substantially prolonged response-verification processes following reflexive intention retrieval. Our findings provide novel insights into the processes underlying intention retrieval and show that mouse-movement tracking can be a valuable tool to assess process dynamics in prospective memory.

Keywords: Prospective Memory, Mouse Movement Tracking, Memory, Inhibition, Monitoring, Cognitive Control

Presentation type: Poster Presentation

Session: Motor and action control

Challenges and future directions in misinformation research

Pia Lamberty, Mubashir Sultan, Michael Geers, Lena Nadarevic

Misinformation Research - Quo Vadis?

This panel discussion will aim to map the current state of understanding on the psychology of misinformation, while also providing recommendations for future research and interventions. First, we will define the problem of misinformation and what research efforts should focus on—understanding and tackling its biggest challenges. Second, we will outline the current state of misinformation research, including the focus of current research, the ecological validity of the experimental paradigms, and the extent to which the research may have come short on building on previous findings in psychological research. We will also discuss the question of whether current research efforts may have individualized the problem of misinformation, thereby diverting attention and support from regulatory efforts at the level of institutions. Finally, we will take a glimpse into the future and discuss how misinformation research could proceed. The panel will

feature Lena Nadarevic, Mubashir Sultan, Michael Geers (the presenters of talks 1-3 of the symposium), and Pia Larmberty, who is the co-director of the Center for Monitoring, Analysis and Strategy (CeMAS). CeMAS is a think tank that monitors digital platforms and aims to develop an early warning system against digital conspiracy ideologies, disinformation, and right-wing extremism. With her applied work, Pia Lamberty will provide a novel perspective that many experimental psychologists may not have. Overall, we hope attendees will leave with a better understanding of misinformation research and some practical tips on how to advance this young field.

Keywords: Misinformation, research

Presentation type: Oral presentation / Talk

Session: Misinformation Research - Quo Vadis?

Semantics of gaze – How listeners' gaze direction, direction changes and blink frequency are interpreted

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A person's gaze behavior has considerable influence on how they are evaluated by others. However, interpreting someone else's gaze can also depend heavily on the context. Our aim was to systematically and comprehensively explore the "semantics of gaze" in different contexts using a two-step procedure (qualitative-quantitative). Participants watched short video clips of one person listening to an autobiographical episode narrated by another person. We extensively manipulated the listener's gaze behavior in terms of gaze direction (direct, down, up, side), frequency of changes in gaze direction and blink frequency (every 2, 4, 6 seconds). In addition, emotional context was manipulated by the valence of the narrated episodes (neutral versus negative). In a first, exploratory study, participants freely described which characteristics, feelings, and intentions they attributed to the listener in each condition. This allowed us to identify several relevant aspects of person perception (e.g., attentiveness, likability, calmness) and construct respective rating scales. In a second, quantitative study, participants used these scales to indicate their impressions after each of the videos. Results suggest that listeners were systematically and differentially evaluated depending on their gaze behavior. For example, rapid blinking and rapid changes in gaze direction were rated more negatively than slower gaze behavior in various respects (e.g., as inattentive). Downward gaze was evaluated more positively (e.g., as empathic) than other gaze aversions, especially in the emotionally negative context. Overall, our studies contribute to deciphering the meaning of gaze behavior in different emotional contexts.

Keywords: direct gaze, emotional context, gaze behavior, social cognition, social interaction

Presentation type: Poster Presentation

Session: Moral decisions and social interaction

On the size and distribution of monetary reward effects in overlapping dual-task situations

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In overlapping dual-task (DT) situations, a bottleneck causes serial processing of task 1 and task 2 processes and leads to increased reaction times of task 2 (RT2) with decreasing interval between both tasks. Here, we investigated how monetary reward affects DT processing and more specifically, whether rewarding either task 1 or task 2 as compared to rewarding both tasks at the same time yields to different improvements of DT processing. Previous studies showed that the application of reward to either task 1 or task 2 leads to equal improvements of RTs, with a localization of the main reward effect at task 1 before the bottleneck; the observed RT1 shortening propagated via the bottleneck to task 2, which shortened RT2 in both conditions. Based on that, we predicted that rewarding both, i.e. task 1 and task 2 at the same time should sum-up the reward effects for both tasks onto task 1 processing and this should result in double-sized monetary-reward effects compared to conditions with only one rewarded task. Experiment 1, tested the effects of rewarding task 1 and task 2 with 1 Euro per task, summing up to 2 Euros distributed across the tasks. Experiment 2 tested reward effects with 2 Euros for task 1 but no-reward for task 2. The results showed twice as large reward effects in Experiment 1 compared to Experiment 2. This indicates a summing up of the magnitude of the reward effects localized at task 1, if task 1 and task 2 are separately rewarded.

Keywords: dual-tasking, PRP, motivation, reward

Presentation type: Oral presentation / Talk

Session: Dual tasks and action control

Revisiting Watching eyes effect: Eye expression, sex, and age influence stereotypical behaviors

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The watching eyes effect influences people to behave more prosocially or less antisocially. It is currently unknown how the eyes themselves induce this effect. To fill this gap, we varied emotional expressions (angry, fear, happy, neutral), age (old, young), and sex (male, female) of the watching eyes to investigate which characteristics influence antisocial behaviors. Participants rated the extent they would utter 36

stereotypical statements about race, gender, and religion topics. Each statement was presented together with a pair of eyes. Approval of stereotype statements with neutral eyes did not differ from control flowers. However, age, sex, and emotional expressions of the watching eyes influenced the extent participants would utter the statements: angry old male eyes increased stereotypical statements, as did happy young eyes (males and females). Fearful eyes decreased the extent to utter stereotypical statements, except for old female eyes. Our data suggest that studies presenting eyes that appear neutral may be why replication of this effect was unsuccessful. Furthermore, the stylized eyes used in many watching eyes experiments could be interpreted as angry old male eyes to elicit changes in making donations or rating scales. We recommend further research to examine the eyes used to better understand the underlying mechanism of this effect. Collectively, our findings show that even when testing for antisocial behaviors, like the extent to utter stereotypical statements, the watching eyes effect may be better replicated with angry old male eyes or young eyes, and across different emotional expressions, age groups, and sex of the eyes.

Keywords: watching eyes, watchful eyes, antisocial behavior, stereotype, ratings

Presentation type: Oral presentation / Talk

Session: Person perception

Distractor-response binding within and between the senses

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The binding between stimuli and responses has been proved an important mechanism in action control. It has been found that features of a stimulus and an executed response are integrated together into one event file. A re-encounter with one or more of the stored features causes the automatic retrieval of the previously constructed event file including the previous integrated response (Hommel, 2004). The distractor-response binding effect evidenced that even irrelevant stimuli can be integrated with a response and thereby have an impact on behavior. In the present study, we focused on the level of representation of response-irrelevant distractor stimuli. To this end, a crossmodal distractor-response binding paradigm was used that enables the differentiation between the perceptual and conceptual representation of the distractor by allowing the systematic variation of conceptual distractor features independent of perceptual repetitions. The results suggest that the repetition of perceptual distractor features is indispensable for the initiation of the retrieval process while the sole repetition of conceptual distractor features is not sufficient to start the retrieval process.

Keywords: Distractor-Response Binding; Level of Representation; Crossmodal Binding

Presentation type: Poster Presentation

Session: Stimulus-response and response-effect binding

Influence of executive control and semantic relatedness on the attentional blink

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The attentional blink (AB) indicates a temporary processing bottleneck induced by processing of a first target (T1). When stimuli are processed in rapid succession, processing of a subsequent second target (T2) is impaired by several hundred milliseconds. The AB represents workings of a late attentional filter, pointing to involvement of working memory processes. In four experiments we investigate the contribution of such processes. First, in both laboratory and internet-based experiments we demonstrate that the AB is affected by the executive control demands induced by T1. Using Stroop interference resolution as an executive control task, we observed considerably larger AB after incongruent T1. Second, we provide evidence from a lecical decision task suggesting that backward priming can help overcome the attentional blink. We observed equal amounts of semantic priming of a third target (T3) irrespective of whether T2 was presented during the AB or not. However and unexpectedly, when T2 and T3 were semantically related, the AB was reduced. Since T3 was presented long after T2 presentation, this is likely to be a post-decisional effect. Possibly a semantically related T3 acts as a retrieval cue for T2, which lifts T3 above the consciousness threshold during retrieval. Third, we provide the first evidence of a high-level auditory blink, suggesting that the discrimination of musical instruments in the presence of discraction (e.g., following one instrument in an orchestra or a jazz ensemble) inpairs the subsequent discrminination of other instruments. Taken together these results corroborate the late locus of selection the attentional blink.

Keywords: Attention, Working Memory, Attentional Blink, Auditory Perception, Executive Control

Presentation type: Oral presentation / Talk

Session: Basic attention

Spatial-numerical associations depend on spatial frequencies: evidence from a go/no go IAT.

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Spatial numerical associations (SNAs) are ubiquitous. For symbolic stimuli, SNAs are shaped by cultural experience, including association with the Cartesian coordinate system. However, SNAs for numerosities are even found in infants and newborn chicks.

Recently, the brain's asymmetric frequency tuning hypothesis (BAFT, Felisatti et al., 2020) proposed that SNAs are really caused by a more fundamental perceptual property, spatial frequencies, for which many animals have hardwired low-level detectors in early vision, and whose processing is lateralized. This grounding in a basic perceptual quality is a valid numerosity signal because numerosity and spatial frequencies are typically confounded. Here we provide the first experimental evidence for the BAFT hypothesis by unconfounding spatial frequencies and numerosity. We compared stimuli that were equalized for their spatial frequency spectrum with standard numerosity stimuli. A go/no go task IAT task was used to avoid spatial response bias. Responses to small or large numerosities were paired with responses to arrow stimuli in mixed blocks, and mapping rules were switched between blocks, e.g., "respond only if left arrow or small numerosity". We observed a spatial-numerical congruency effect only for the standard stimuli. We conclude that spatial frequency information is a fundamental quality informing numerosity judgments.

Keywords: Spatial numerical association; Spatial vision; numerosity; number processing

Presentation type: Oral presentation / Talk

Session: Number processing

The adaptation and validation of open-source morphological awareness tests for web-based experiments

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Morphological Awareness (MA), a metalinguistic skill contributing to literacy and spelling development, has been an important area of research in psycholinguistics. Based on a systematic review, existing MA tasks have low reliability and debatable validity, which might affect replicability. Additionally, the outbreak of COVID exposed the paucity of measurement instruments for assessing morphological awareness online. Most MA tests are production-task-based, making online implementation difficult. The lack of quality measurement instruments for online studies has impeded replication in psycholinguistic studies. The current study adapts and validates three open-source morphological awareness tests for web-based experiments: The Base Form Morphology (BMorph) task, the Derived Form Morphology (DMorph) task, and the Wug test into multiple-choice measures. More than 150 L1 and L2 English-speaking adult readers of diverse language backgrounds were recruited from social media and university mailing lists by snowball sampling. We measured the participants' test scores in our adapted MA tasks, vocabulary knowledge and reading comprehension tests. We examined the psychometric properties of our adapted MA measures, including internal consistency reliability and convergent validity using structural equation modelling

(SEM). The current study would provide three adapted and validated open-source MA tasks for web applications. It would also bring researchers' attention to the issue of questionable measurement qualities in psycholinguistics. The full versions of our adapted MA tests are made publicly available on the Open Science Framework.

Keywords: morphological awareness, morphology, web-based experiments, English as a foreign language (EFL), open-source measures

Presentation type: Poster Presentation

Session: Language

The effect of task-irrelevant sounds on counting performance

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Serial recall performance of visually presented items is impaired by task-irrelevant speech that the participants are instructed to ignore. This so-called Irrelevant Speech Effect (ISE) has been attributed to attentional capture, interference with the efficiency of serial rehearsal, or interference with phonological representations. Here, we used a task that required constant counting to learn more about the task characteristics that are responsible for evoking the ISE. In the continuous counting task, participants counted the number of two symbols (rectangles and triangles) that appear consecutively on a computer screen. Participants (N=83) were assigned to one of three "switch-rate" conditions that varied in cognitive load based on the frequency with which symbols changed within one trial (25%, 50%, or 75%). Performance was measured in silence, and with foreign speech and environmental sounds, that the participants were instructed to ignore. Counting accuracy and reaction times were negatively affected by the task-irrelevant speech, but not by the environmental sounds. Furthermore, the ISE did not interact with cognitive load. These findings suggest that it is not necessarily the serial order component nor attentional capture that is sufficient for ISE evocation. The general implications for the role of ISE evocation will be discussed.

Keywords: Irrelevant sound effect, working memory, executive functioning, attention, counting, cognitive load

Presentation type: Poster Presentation

Session: Cognitive control and conflict

The Effect of a Third Wheel on Joint Action: An Exended Simon Task with Three Actors

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The Social Simon Effect (SSE) occurs in a Go/Nogo setting (joint condition) when interacting with a partner, but not in an individual condition. This seminal finding has started the discussion regarding the underlying underpinnings, being social (e.g. co-representation of the co-actor's task) or nonsocial (e.g. reference frame) in nature. Albeit this debate is far from settled, the present study investigates whether the SSE would still be present with the involvement of more then two participants. Here, three participants, i.e. two co-actors and one confederate, performed a Go/NoGo Simon task together. The presence or abscense of the confederate varied between subjects. The seating position of both co-actors varied between subjects in such a way that half of the co-actors were seating directly next to one another and the confederate (or an empty chair) on the side, whereas in the other group, the confederate was placed between both co-actors. The Simon task was performed as a joint Go/NoGo task (with co-actor) and individual Go/NoGo task in a within subjects design. The study followed a 2 Seating Position (middle vs. outer) x 2 confederate (presence vs. absence) x 2 Stimulus compatibility (compatible vs. incompatible) x 2 Setting (joint vs. individual) design. Both co-actors responded to the color of the stimuli, whereas the confederate reacted to the stimulus shape. In the talk, results will highlight the role of the triad and seating position for joint action and therefore also the role of social and nonsocial factors underlying the social Simon effect.

Keywords: Social Simon Effect, Go/No-Go Task, Joint Action

Presentation type: Oral presentation / Talk

Session: Spatial Compatibility Effects: Old effects, new ideas and a bright future II

Expected Distractor Context Biases the Attentional Template for Target Shapes

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Visual search is supported by an internal representation of the target, the attentional template. However, which features are diagnostic of target presence critically depends on the distractors as well. Accordingly, previous research showed that consistent distractor context shapes the attentional template for simple targets, with the template emphasizing diagnostic dimensions (e.g., colour or orientation) in blocks of trials. Here, we investigated how distractor expectations bias attentional templates for complex shapes, and tested whether such biases reflect inter-trial priming or can be instantiated flexibly. Participants searched for novel shapes (cued by name) in two probabilistic

distractor contexts: either the target's orientation or rectilinearity was unique (80% validity). Across four experiments, performance was better when the distractor context was expected, indicating that target features in the expected diagnostic dimension were emphasized. Attentional templates were biased by distractor expectations when distractor context was blocked, independently of self-reported awareness of the manipulation. Interestingly, attentional templates were also biased when distractor context was cued on a trial-by-trial basis, but only when the two contexts were consistently presented at distinct spatial locations. These results show that attentional templates can be highly flexible, incorporating expectations about target-distractor relations when looking for the same object in different contexts.

Keywords: attentional template, visual search, selective attention, distractor expectations

Presentation type: Oral presentation / Talk

Session: Basic attention

Beeinflusst eine kurzzeitige Achtsamkeitsintervention das Ausmaß des Bias Blind Spot bei Studierenden?

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Der Bias Blind Spot besagt, dass Personen sich selbst im Allgemeinen weniger von kognitiven Urteilsfehlern beeinflusst einschätzen als andere Personen. Die vorliegende Studie untersuchte den Bias Blind Spot bei typischen Situationen im Hochschulkontext. In einem Online-Experiment (N = 168) wurde anhand von Fallvignetten aus dem universitären Alltag der Fragestellung nachgegangen, ob Versuchspersonen einer studentischen Stichprobe sich und Dozierende im Allgemeinen weniger von kognitiven Urteilsfehlern beeinflusst einschätzen als ihre Kommiliton*innen. Zusätzlich wurde untersucht, ob eine kurzzeitige Achtsamkeitsintervention (n = 53) im Vergleich zu einer Aufklärung zum Bias Blind Spot (n = 54) oder keiner Intervention (n = 61) zu einer Reduktion des Bias Blind Spots führte. Alle Faktoren wurden randomisiert und bei jeder Vignette war nur eine Einschätzung zu treffen. Die Versuchspersonen schätzten sich über alle Versuchsgruppen hinweg signifikant weniger von Urteilsfehlern beeinflusst ein als Dozierende und Kommiliton*innen, zwischen denen sich keine Bewertungsunterschiede fanden. Die Achtsamkeitsintervention hatten zudem keinen signifikanten Effekt auf das Ausmaß des Bias Blind Spots in der Stichprobe. Die Ergebnisse zeigen die Relevanz des Bias Blind Spots im Hochschulkontext.

Keywords: Bias Blind Spot, Achtsamkeit, Interventionen, Hochschule

Presentation type: Poster Presentation

Session: Moral decisions and social interaction

Klassifizierung von Fahrerassistenzsystemen nach ihrer Auswirkung auf die mentale Belastung

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Fahrerassistenzsysteme (ADAS) versprechen die Sicherheit und den Komfort für Fahrer und Fahrerinnen zu erhöhen, diese zu unterstützen, sowie die Zahl der Todesopfer und die Schwere von Verkehrsunfällen zu verringern. Ihr Einsatz geht jedoch mit einer erhöhten Menge an Informationen, Signalen und Rückmeldungen einher, die verarbeitet, bewertet und auf die reagiert werden muss. Der vorliegende Beitrag zielt darauf ab, diese Aspekte unter Berücksichtigung der mentalen Belastung zu beleuchten. Bisherige Studien auf diesem Gebiet zeigen gemischte Ergebnisse, die sowohl ADAS-bedingte Verringerungen und Erhöhungen der mentalen Belastung als auch keine Auswirkungen bei der Nutzung der Systeme aufzeigen. Wir schlagen eine Klassifizierung von ADAS anhand von drei Dimensionen vor: 1) präsentierte Informationen, 2) geforderte Handlungen und 3) Zeitspanne zwischen Information und Handlung. Aus der Bewertung der drei Dimensionen lassen sich vier Kategorien ableiten, in die ADAS auf der Grundlage ihrer Auswirkungen auf die mentale Belastung der Fahrer:innen eingeordnet werden können. Die Klassifizierung bildet eine optimale Ergänzung zu bestehenden Ansätzen, die sich zumeist auf die Verkehrseffizienz, die Auswirkungen auf die Sicherheit, das Ausmaß in dem sie in den Fahrprozess eingreifen, die Art der von ihnen unterstützten Fahraufgabe oder rein technische Parameter konzentrieren.

Keywords: Mentale Belastung, Fahrerassistenzsysteme, Mensch-Maschine Interaktion, digitale Technologien

Presentation type: Oral presentation / Talk

Session: Technology acceptance and risk assessment

Feeling left out: How ostracism and social rank influence adolescents' risky decision-making

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It is assumed that adolescents engage in risky behaviors due to the fear of being excluded or disvalued by peers. In this study, we examined how ostracism and social rank jointly influence the assessment of risky situations in adolescence. To examine how ostracism influences risky decision-making, we had adolescents aged 11 to 19 years experience both social inclusion and exclusion from a fictitious peer group in a virtual ball-tossing game. Adolescents then respectively completed a card game in which information about wins, losses, and probabilities of loss was presented for each

trial. Participants were also assigned to two groups that received either individual feedback on their performance or a disclosed social ranking. Preliminary results from the mid- (n = 21; 14-16 years) and late adolescent groups (n = 23; 17-19 years) suggest that adolescents were generally sensitive to contextual information, making less risky decisions when losses were likely and high and when gains were low. Mid- and late adolescents, however, responded with opposite behaviors when influenced by peers. Late adolescents took more risks after social exclusion than inclusion and more risks in the group with social rank feedback than with individual feedback, whereas the opposite was true for mid-adolescents. Interestingly, most of these effects were observed only when potential losses were small. The findings suggest not only developmental differences in how interpersonal behavior influences risk-taking across adolescence, but also that framing risks as costly may be an appropriate approach to prevent negative health outcomes in adolescents.

Keywords: adolescence, peers, decision-making, risk-taking, ostracism, social rank

Presentation type: Poster Presentation

Session: Moral decisions and social interaction

How do motives for sharing relate to content features on Twitter?

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Nearly four billion people around the world now use social media platforms such as Twitter and Facebook, and social media is one of the primary ways people share information with others. Often the implicit assumption when studying this behavior is for people to share content to inform others, but there might be several other motives at play. Here, we devise a novel experimental paradigm linking survey data (i.e., users' motives for sharing) with behavioral Twitter data (i.e., users' tweets) in a sample of N = 200 U.S. Twitter users over a period of six weeks, spanning March to May 2022. Our results suggest that most users share information to draw attention to a topic, express their opinion, and connect with others. These general motives for sharing differ across demographics, such as age, gender, and education. When linking users' motives for sharing information to the tweet content characteristics, we reveal distinct topic-motive patterns: Most users shared content about the COVID-19 pandemic to draw attention to an issue; shared content about the Russian invasion of Ukraine to inform others; and expressed their opinion when tweeting about U.S. politics (e.g., Trump vs. Biden). Moreover, popular content is shared to entertain others and less popular content is shared to connect with the authors. These results contribute to the scholarly understanding of social media users' behavior and its dependence on the information context, and can inform interventions against detrimental sharing behaviors.

Keywords: misinformation, sharing, social media, motives, content characteristics

Presentation type: Oral presentation / Talk

Session: Misinformation Research - Quo Vadis?

Is quantifier interpretation susceptible to gestural influence?

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Vague quantifiers such as “some” or “several” do not correspond to exact numerical values but are instead understood with respect to their linguistic context and co-present visual information (e.g. Coventry et al., 2010; Moxey & Sanford, 1993). This study investigates the influence of co-speech gestures on the interpretation of “several.” Previous experimental work has shown that people associate larger areas with greater magnitudes (e.g., Henik & Tzelgov 1982, Hurewitz et al., 2006), and the same applies to more expansive gestures (Woodin et al., 2020). In our pre-registered study, participants (N=400) were asked to watch a video of a speaker uttering sentences such as “400 people were at the protest. Several of them got arrested.” The hands moved either outwards or inwards during the underlined phrase (between-subjects). We analysed numerical estimates as a function of gesture with a Bayesian mixed beta-binomial regression model, finding a weak gesture effect: participants assigned higher quantities to a speaker performing an outwards gesture than a speaker performing an inwards gesture (logit coefficient: b=0.07, [-0.09, 0.22]). Confounded factors that became apparent after conducting the experiment led us to pilot a within-subjects follow-up study (30 participants) which additionally contained a no-gesture condition. This design showed a much stronger gesture effect (logit coefficient: b=0.89, [0.56, 1.22]), suggesting that the weak results of Experiment 1 may be because within-subjects control is needed to account for individual differences in how quantifiers are interpreted. We discuss the implications of these findings for future work in numerical cognition and multimodal communication.

Keywords: quantifiers, numerical communication, co-speech gestures, vagueness, uncertainty, quantities

Presentation type: Oral presentation / Talk

Session: Number processing

Supplementing Experimental Data Analytics with Order-Constrained Inference

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A common approach to theory testing in experimental psychology relies on null hypothesis significance testing via (generalized) linear regression models. We showcase order-constrained methods as an alternative route to behavioral decision analytics. Order-constrained inference can improve the precision and nuance of theory testing. For example, the method can be leveraged to quantify the evidence in support of, or against, a given hypothesis. It also offers advanced model selection tools for quantitative competition among multiple theories. To illustrate our case for order-constrained methods, we re-analyze data from a pre-registered experiment on incentives, cognitive reflection, and dishonest behavior. Using this example, we advocate for order-constrained inference as a tool for researchers to better tailor their analytical procedure to the theory under investigation. This allows them to eschew arbitrary auxiliary assumptions on the theoretical level whose only purpose is to legitimize the statistical model underlying conventional analyses. We further highlight the advantages of Bayesian order-constrained inference and show how, in an experimental setting, it can deliver more convincing and more nuanced evidence than frequentist null hypothesis significance testing. This also opens new avenues of research for supplementing and expanding experimental designs in psychological research.

Keywords: Order-constrained inference, Bayesian statistics, Regression analysis

Presentation type: Oral presentation / Talk

Session: Advances in data analysis

On the Automaticity of Language and Instruction

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There is an ongoing debate on how the meaning of words is retrieved in a newly-learned language L2. Two processes are assumed: L2 words retrieve underlying concepts via associations with the corresponding words in the first language, L1, (word association hypothesis) or L2 words gain direct access to underlying concepts (concept mediation hypothesis). It is commonly shown that a higher language proficiency is needed to access word meanings directy via concepts. However, evidence for newly-learned words and the initial learning of novices are scarce. Using an item-specific priming paradigm, we demonstrate that classes and actions (e.g., “small, right!”) merely instructed during an item’s prime lead to repetition priming effects (i. e., reduced reaction times for item-specific class/action mapping repetitions) in the item’s subsequent probe (lag 2-7 trials). Crucially, this was the case to a comparable degree both when participants were instructed in L1 and when they were instructed in an L2 which they had no knowledge of prior to a brief practice phase at the beginning of the experiment. These findings indicate that the direct route to concepts can be accessed already in the very beginning of language learning and highlight how fast newly-learned words become able to automatize behavior.

Keywords: second language learning, instruction, item-specific priming, automaticity

Presentation type: Oral presentation / Talk

Session: Tell me and talk to me – the influence of language on goal-directed performance

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The implicit learning of cross-modal sequences

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Theories in implicit learning indicate that implicitly learned information is processed in encapsulated modules that work independently from each other and do not interact. These modules are domain specific. Thus, visual and spatial information is for example processed in different modules (e.g., Keele et al., 2003). For the serial reaction time task (SRTT; Nissen & Bullemer, 1987), this assumption implies that a visual and a spatial sequence can be learned implicitly in parallel (e.g., Haider et al., 2018). However, if processing of visual and spatial information occurs in different independent modules, a cross-modal sequence that contains both, visual and spatial information should not be learned. Here, we investigated whether the learning of such a cross-modal sequence is possible. To answer this question, we created a SRTT that contained an eight element sequence consisting of visual (target colors) and spatial (motor responses) information. This cross-modal sequence was realized with four possible transitions (visual-visual; visual-spatial, spatial-spatial, spatial-visual). We expect that the transitions within a dimension (visual vs. spatial) should be learned whereas the cross-modal transitions should not. Such a finding would support the assumption that in implicit learning, the processing of the implicitly learned information occurs in encapsulated modules that are specific for different dimensions (e.g., visual or spatial) and that do not interact.

Keywords: implicit learning

Presentation type: No-Data Poster

Session:

Comparison of maximal performance tests with and without simultaneous mental rotation

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Classical cognitive-motor dual-tasks typically show impairments in the accuracy and stability of either cognitive or coordinative motor performance due to shared cognitive demands. Even for automated motor tasks such as aerobic activity acute effects on cognitive performance are observed. These can be explained by shared neural resources of limited capacity such as self-control (strength models) or by conflicting

brain activation (reticular-activating hypofrontality model). In line with these models, previous research found a bidirectional increased effort during simultaneous cycling and mental rotation tasks compared to isolated tasks. However, performance could be upheld. As neural resources can be limited in both the maximum capacity and in the amount available over time, detrimental effects should be enhanced at higher intensities. Thus, the current study aims to investigate the interaction of both tasks under maximum physical load. Fifty participants performed two step tests on a cycling ergometer. Starting resistance was determined by gender, body weight, and weekly physical activity. Resistance was increased by 30/20 watt (male/female) every three minutes. During one test, participants simultaneously executed mental rotation tasks. Cognitive (reaction time, accuracy) and physical (power output, average pedalling cadence) performance, as well as objective (heart rate) and subjective (cognitive and physical ratings of perceived exertion) effort were measured during the respective tests. We mainly expect to find bidirectional increased effort and/or impaired performance in the dual-task condition. Linear mixed models will be used for statistical analysis. Data are collected and results will be available for the conference. The study was preregistered at osf.io.

Keywords: mental rotation, dual-task, maximal performance test

Presentation type: Poster Presentation

Session: Cognitive flexibility

Strategic use of quantifiers in reporting statistics

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People can construe quantities using a variety of different communicative strategies, including quantifiers such as “some”, “every” and “none” (van Tiel et al., 2021). However, despite a recent shift of attention in the literature towards argumentation-based accounts (Moxey & Sanford, 2000), little is known about how such expressions are used strategically to frame quantities as either large or small. Here we experimentally investigate how English speakers use quantifiers to construe the outcome of a school exam either positively or negatively without blatantly lying. In Experiment 1, we asked 30 participants to describe pictures depicting different exam outcomes by filling sentences with two quantifiers and an adjective (i.e. “some of the students got all of the questions in the exam right”). In Experiment 2, we asked 30 participants to describe the same scenes by typing in their own descriptions. In both experiments we manipulated how the descriptions were to be framed, namely as depicting either a good or a bad outcome. The results of Experiment 1 show that people use informationally weaker expressions, such as “some” as opposed to “all,” when having to frame a good outcome as a poor performance or a bad outcome as a strong performance. Experiment 2 replicates this general finding, which shows that people use informationally weaker expressions in cases of a mismatch between quantity and high/low framing even when the task is not forced choice.

Keywords: communication,quantities,quantifiers,strategic communication,argumentation,framing,numerical language

Presentation type: Oral presentation / Talk

Session: Text comprehension

Relationsanalyse (RELAN) – Aussagenlogische, statistische und kausale Analyse von Daten

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Einleitung: Seit der Einführung des Korrelationskoeffizienten, wurde er in Millionen von biologischen, soziologischen und psychologischen Studien verwendet. Viele komplexe statistische Methoden wie Faktorenanalyse, Regressionsanalyse, Strukturgleichungsmodellierung basieren auf dem Korrelationskoeffizienten - trotz seiner statistischen Schwächen (Abhängigkeit von Verteilungen, Symmetrie der Assoziation, Paarassoziationen, fehlende kausale Interpretierbarkeit). Einige alternative nicht-parametrische Assoziationskonzepte wurden vorgeschlagen (CFA (Krauth & Lienert, 1973), Bayesian Analysis (Phillips, 1974), Inductive Item Tree Analysis (van Leeuwe, 1974; Schrepp, 2003), Boolean Analysis (Flament, 1976), HYPAG (Ortner, Mattes & Wottawa, 1980), Aussagenlogische Analyse von Kontingenztafeln (Eye & Brandstätter, 1984), Prädiktionsanalyse (Hildebrand, Laing & Rosenthal, 1977; Eye, 1991). Methode: Relationsanalyse – RELAN – (Maderthaner, 2022) ist eine neue multivariate, multifunktionale nicht-parametrische statistische Auswertungsmethode, welche auf Aussagenlogik basiert, somit auf verbal formulierte Hypothesen anwendbar ist, und eine realistischere Prüfung von Kausalhypothesen zulässt. Die verfügbare Programmversion (www.relan.at) erlaubt das Testen und Simulieren von Hypothesen (mit bis zu zehn Variablen), die Exploration von logischen Zusammenhängen ("Data Mining") sowie das richtungs- und zeitabhängige Testen von Ursache-Wirkungs-Hypothesen. Ergebnisse: Computersimulationen zeigen, dass korrelative Assoziationsmaße nicht in der Lage sind, einfache und komplexe logische Gesetzmäßigkeiten sowie gerichtete kausale Abhängigkeiten zwischen Variablen aufzufinden. Fazit: Relationsanalysen erlauben eine erschöpfende logische Analyse eines Variablensystems, bei der insbesondere Effekte von Ursachen, Mediatoren, Moderatoren und Wirkungsbedingungen statistisch evaluiert werden können. Maderthaner, R. (2022). Relationsanalyse (RELAN) – Aussagenlogische, statistische und kausale Analyse von Daten

Keywords: Statistical method, variable relations, propositional logic, simulation, cause-effect, exploration

Presentation type: Oral presentation / Talk

Session: Advances in data analysis

Interference in dual tasks: Affective processing in Task 1 can eliminate the effects of Task 2 response inhibition

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Backward crosstalk effects (BCE) are observed in dual-task studies when the characteristics of Task 2 (T2) influence Task 1 (T1) performance. One type of BCE, the no-go BCE, is reported when T2 is a go/no-go task. The usual observation is that when T2 is a no-go, T1 processing takes longer than when T2 is a go. No-go BCE is due to the response inhibition needed to inhibit an already prepared T2 response spilling over to T1 motor execution. Growing evidence shows that response inhibition causes affective devaluation of the associated stimuli due to the negative affect elicited by inhibition. It is unclear how no-go BCE based on response inhibition would interact with affective processing in T1. To test this, we recruited a dual-task paradigm, where T1 is a valence categorization task, and T2 is a go/no-go task. In Experiments 1 and 3, we presented positive and negative words as S1 and color (Experiment 1) and numbers (Experiment 3) as S2. In Experiment 2, we created an affective (mis)match between S1 (positive, negative, neutral) and S2 (high, low tone) through counterbalancing. Overall, we observed a large no-go BCE exclusively when Task 1 was positive but an absent or reversed no-go BCE when Task 1 was negative. Results are discussed in the context of an affective mismatch between S1 valence and T2 response type.

Keywords: Cognitive control, dual-task, dual-task interference, response inhibition, affective processing

Presentation type: Oral presentation / Talk

Session: Cognitive control

Effects of Physical and Social Components of Exclusion on Emotional Distress, Prosocial and Antisocial Behavioral Intentions

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Social exclusion has been defined as the experience of being kept apart from others physically or emotionally. Over decades, a substantial body of experimental research has shown that people are negatively affected by emotional forms of exclusion (i.e., rejection or ostracism). Studies conducted during the COVID-19 pandemic further suggest that physical exclusion (i.e., a lack of physical contact) impairs well-being but that effects could depend on how socially included individuals feel. However, no experimental research has examined the effects of different combinations of the

physical and social components of exclusion and how they might interact. Across two studies (*N* = 1,238), we manipulated both components separately via an imaginative scenario paradigm and measured their impact on established social exclusion outcomes (i.e., affect, needs, loneliness, prosocial and antisocial behavioral intentions). Effects of physical exclusion on emotional distress were dependent on individuals' social inclusionary status. Social inclusion was not able to eliminate negative effects of physical exclusion but to protect well-being to some degree compared to when individuals were physically and socially excluded. Social exclusion, irrespective of being paired with physical in- or exclusion, affected individuals most negatively. Physical and social exclusion lowered prosocial intentions independently from each other. For antisocial intentions, the physical component played a subordinate role: physical exclusion affected antisocial tendencies only under neutral social contact. Our findings add to a more nuanced understanding of social and physical aspects of exclusionary experiences.

Keywords: social exclusion; ostracism; physical exclusion; isolation; physical contact

Presentation type: Poster Presentation

Session: Moral decisions and social interaction

A simple formula for Bayesian shrinkage to correct regression to the mean

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As a method to investigate the scope of unconscious mental processes, researchers frequently collect a behavioral measure (e.g., some assessment of learning) and a measure of awareness (e.g., recognition judgments) of the critical cue or contingency. Evidence that behavioral change was indeed unconscious may require that participants were unaware of the critical regularity or that behavior and awareness are independent—both of which are commonly demonstrated using standard statistical tests (e.g., *t*-tests, correlation/regression analysis). We highlight a critical limitation in these approaches: Systematic bias caused by ignored measurement error (e.g., regression to the mean, regression attenuation) can lead to false-positive rates up to 100%. As a solution, we propose a correction formula for observed data based on the ideas of true-score estimation in educational testing and shrinking estimates towards a grand mean in Bayesian modeling. Because error is defined as imprecise measurement of an individual's true score, information about the individual (e.g., their group membership) and the measure (e.g., its reliability) can be used to move observed scores closer to their true scores. Our formula provides corrected estimates as a weighted combination of the observed score and the group mean. We discuss different weighting methods and compare their performances in simulation studies. Our work shows that true-score estimation provides the means to correct data for measurement error: The corrected data offer a more representative sample to test the research hypothesis and

consequently better inferences in scientific decision-making. We conclude by offering best practices for correcting measurement error in psychological research.

Keywords: unconscious processes, implicit cognition, measurement error, reliability, regression to the mean, Bayesian methods

Presentation type: Oral presentation / Talk

Session: New methodological approaches to measuring unconscious mental processes

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A paradox of perceived speed and location in the Fröhlich effect

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In the Fröhlich effect, the initial position of a moving object tends to be mislocated in its direction of motion. Not too surprisingly, when the duration of the movement is short, the magnitude of the spatial bias is also small (Rubin, 1930). This motion duration property of the Fröhlich effect is a challenge for most existing models that predict little or no effect of duration. We measured localisation biases at the onset of moving objects in a psychophysical experiment using a forced-choice method. To reduce the effects of spatial and temporal predictability, two vertical lines were flashed one above the other at random spatial locations and random times. One of the two lines was set in motion as soon as it appeared, and the other remained static. Observers were instructed to report whether the top line was to the right or the left of the bottom one. Spatial offsets were controlled by interleaved staircases. We found that the magnitude of the spatial bias increases greatly with motion duration and reaches a plateau at about 200ms. Interestingly, before reaching the plateau, spatial biases were almost as large as the full trajectory of the object, suggesting that the moving object was almost perceived static. In a separate experiment, we measured the perceived speed for different durations and found a large over-estimation of perceived speed for durations shorter than about 200ms. Therefore, there seems to be a paradox in that the same moving object appears both almost static and moving very fast.

Keywords: Motion perception, Time perception, Fröhlich effect

Presentation type: Oral presentation / Talk

Session: Spatial changes over time: current developments in motion perception

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The attentional earlid: Visual attention is surprisingly robust to concurrent auditory distraction

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Distraction due to salient-but-irrelevant visual distractors during visual search is well established. Using a cross-modal adaptation of the additional-singleton paradigm, we investigated the generalisability of this classic effect to auditory distractors in the present study. In a series of experiments, participants reported whether a salient object (a tilted bar among a dense array of vertical bars) was present or absent, while an auditory distractor accompanied some trials. Contrary to expectations, no auditory distraction effect was observed. Auditory distraction failed to occur even when the distractor was presented as a rare oddball stimulus or additionally with a temporal advantage of 300 ms. Finally, when the auditory modality was made globally relevant, while still maintaining its irrelevance to the search task, we observed a distractor interference effect. Taken together, these results indicate that a highly efficient attention mechanism exists to block auditory distraction from interfering with visual tasks if the auditory modality is completely irrelevant. We call this phenomenon, the attentional earlid – since it works much the same way as the eyelid does in blocking irrelevant visual stimuli, but instead of being a physical barrier it is attentional.

Keywords: visual search, auditory distraction, additional-singleton task, auditory oddball

Presentation type: Oral presentation / Talk

Session: Applied attention

Is a Simpler Explanation Preferred Even When It Doesn't Fit The Data? An Attempt To Measure Simplicity Bias Experimentally

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Simplicity bias (SB) is the tendency to prefer simple over complex explanations when reasoning, ignoring the explanatory power of that explanation. Preferences for simpler explanations often match the higher prior probability of a model. One research line interprets simplicity as a cue for a higher probability of a model when the probability information is omitted. On the other hand, within the heuristics and biases approach to human cognition, it is well established empirical fact that reasoning about probabilities violates formal norms of rationality. To explore if the SB can be defined as another cognitive bias, we proposed to set comprehensiveness of explanation as a norm, and aimed to provide experimental evidence that people deviate from this norm, when manifest the SB. Participants were presented with 30 SB tasks that included relations between causes and consequences and then asked to choose between the offered simple or complex explanations. SB tasks were divided into two subsets that differed in

comprehensivness. In the standard situation (SS) subset, both simple and complex explanations were comprehensive, and in the conflict situation (CS) subset only complex explanations were comprehensive. The participants' scores were counted as a proportion of simple explanations chosen in SS and CS separately. The one-way repeated-measures ANOVA reveals that participanta chose simple explanations significantly more frequently in SS than in CS ($F(1,194)=148.344$, $p< .01$, $\eta^2= .43$). This result doesn't directly support our hypothesis, though it can be discussed regarding the possibility that SB tasks elicited type 2 of thinking in subjects.

Keywords: simplicity bias, reasoning, judging, cognitive biases

Presentation type: Oral presentation / Talk

Session: Decision making

Does the form matter? Effects of visual presentation of base rates on the base rate neglect in future HR managers

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Base rate neglect (BRN) refers to the human tendency to neglect explicitly given a priori probabilities while judging. This phenomenon was firmly registered across many domains of people's cognitive functioning. In management, accurate reasoning based on probabilities is an important skill. Predicting employees' behavior given on probabilities is often a requirement for HR managers. Yet, based on our research, there is still no direct experimental data that illustrate the presence of BRN in HRs. Therefore we aimed to explore if HR managers are sensitive to BRN and if visual presentation of base rates improves their reasoning. Participants (N = 65), who were postgraduate students of HR management, solved 20 BRN tasks, that varied within subjects, in representativity of description and format of base rates, yielding 4 different types of tasks. Within each type of task, five different situations were presented. Hence, we computed the proportions of the biased answers for every participant for each type of the task. The two-way repeated-measures ANOVA revealed that the proportion of biased answers is significantly higher on the representative tasks ($F (1,64) = 117.870$, $p < .001$, $\eta^2 = .470$) and when the tasks presented visually ($F (1,64) = 20.742$, $p < .001$; $\eta^2 = .047$), but that there is no interaction between representativity and format. Theese results indicate that BRN is expectedly present among future HR managers. Unexpectedly, the visual presentation of base rates didn't improve reasoning, possibly because the form of visualization we used wasn't properly fitted in the task.

Keywords: base rate neglect, HR management, judging, probabilities

Presentation type: Poster Presentation

Session: Moral decisions and social interaction

The Big Five or the Dark Triad? Personality Correlates of Entertainment Preferences

Maria Manolika, Thomas Jacobsen

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Can audience personality influence and probably shape their musical, movie, and reading preferences? Evidence suggests that the Big Five personality traits influence entertainment preferences, yet almost no attention has been devoted to understanding how personality traits beyond the Big Five relate to such preferences. Toward that end, this study aimed at examining how the Dark Triad of Machiavellianism, narcissism, and psychopathy may relate to entertainment preferences beyond the Big Five in a sample of young adults (N = 354). Hierarchical regression analyses revealed that although the Big Five personality traits contribute to understanding preferences for various genres of music, movies, and books, the dark traits of personality demonstrate incremental validity over the Big Five in the prediction of those preferences. These results suggest that while the Big Five personality traits are important in understanding entertainment preferences, the dark traits of personality matter as well. Such an interpretation clearly suggests the necessity to include a variety of personality traits beyond the Big Five in future entertainment research.

Keywords: Big Five, Dark Triad, entertainment preferences, personality

Presentation type: Oral presentation / Talk

Session: Experimental Aesthetics Following Fechner's Conceptions I

Sensory Processing Sensitivity Amplifies Effects Of Post-Learning Activity: Integrating Individual Differences In Experimental Long-Term Memory Research.

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Considering, that most psychological research tests hypotheses by comparing average effects across the sample, it is often overlooked that effects may vary between individuals. Combined experimental and correlational approaches are needed to better test and revise theories of long-term memory, but also to better understand the needs of the individual to support successful learning. Here, we use the example of sensory

processing sensitivity (SPS) to demonstrate how individual differences can contribute to a learning-experiment and shed new light on inconsistent findings regarding beneficial effects of post-learning wakeful rest. SPS describes a temperament trait associated with greater reactivity to and deeper processing of environmental stimuli. In this experiment, we tested whether and how individual differences in SPS contribute to differences in long-term memory consolidation depending on the activity following learning. Sixty-four participants encoded and immediately recalled two word lists followed by two conditions: Either an 8-minute delay of wakeful resting or by performing an attention task. In a second experimental session after 7 days, participants completed a surprise free recall test for both word lists and a SPS-questionnaire. Similar to some recent studies, we did not replicate an overall beneficial effect of wakeful rest on memory retention. However, higher (vs. lower) SPS participants benefited more from the wakeful resting delay, while their memory retention was also more hindered by the attention task. Thus, post-learning activity affects individuals' memory retention to varying degrees. While it had only minor effects on lower SPS individuals' memory retention, it affected high SPS individuals much more.

Keywords: individual differences, long-term memory, wakeful resting, sensory processing sensitivity

Presentation type: Oral presentation / Talk

Session: Learning and encoding

Resting-dependent changes of post-practice oscillatory power predict long-term memory success

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Formation of episodic memories is linked to cortical-hippocampal interactions during learning, practice, and post-learning rest, although the role of cortical activity itself in such processes remains elusive. Behaviorally, long-term retention of episodic memories has been shown to be aided by several different practice strategies involving memory reencounters, such as repeated retrieval and repeated study. In a two-session electroencephalography (EEG) experiment, using data from 68 participants, we investigated the electrophysiological predictors of long-term memory success in situations where such reencounters occurred after learning. Participants learned word pairs which were subsequently practiced either by cued recall or repeated studying in a between-subjects design. Participants' cortical activity was recorded before learning

(baseline) and after practice during 15-minute resting periods. Long-term memory retention after a 7-day period was measured. To assess cortical activity, we analyzed the change in spectral power from the pre-learning baseline to the post-practice resting state recordings. From baseline to post-practice, changes in alpha and beta power were negatively, while slow frequency power change was positively associated with long-term memory performance, regardless of practice strategy. These results are in line with previous observations pointing to the role of specific frequency bands in memory formation and extend them to situations where memory reencounters occur after learning.

Keywords: wakeful rest, memory formation, reencounter, cortical activity, EEG

Presentation type: Poster Presentation

Session: Memory and working memory

Visual processing speed and subjective cognitive complaints in healthy older adults

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Subjective cognitive complaints in older age may reflect subtle objective impairments in basic cognitive functions that might foreshadow broader cognitive problems. Such cognitive functions, however, are not captured by standard neuropsychological testing. Visual processing speed is a basic visual attention function that underlies the performance of cognitive tasks relying on visual stimuli. Here, we test the hypothesis that lower visual processing speed correlates with greater subjective cognitive complaints in healthy older adults from the community. We assessed a sample of 30 healthy, cognitively normal older adults (73.07 ± 7.73 years old; range: 60 – 82; 15 females) with respect to individual subjective cognitive complaints and visual processing speed. We quantified the degree of subjective cognitive complaints with two widely-used questionnaires: the Memory Functioning Questionnaire and the Everyday Cognition. We used verbal report tasks and the theory of visual attention to estimate a visual processing speed parameter independently from motor speed and other visual attention parameters. We found that lower visual processing speed correlated with greater subjective complaints and that this relationship was not explained by age or depressive symptoms. The association with subjective cognitive complaints was specific to visual processing speed, as it was not observed for other visual attention parameters. These results indicate that subjective cognitive complaints reflect a reduction in visual processing speed in healthy older adults. Together, our results suggest that the combined assessment of subjective cognitive complaints and visual

processing speed has the potential to identify at-risk individuals before the standard tests show any suspicious results.

Keywords: Aging, Memory complaints, Subjective function, Subjective cognitive decline, Visual attention, Visual processing speed

Presentation type: Oral presentation / Talk

Session: Advances in TVA-based visual attention research II: Basic and Applied

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Materials and the Brain: Aesthetic Processing in Active Fingertip Exploration

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Active fingertip exploration and aesthetic judgements of different materials' surfaces are part of everyday life. The present study investigated the underlying brain correlates using functional near-infrared spectroscopy (fNIRS). In absence of other sensory modalities, 21 individuals performed lateral movements on a total of 48 textile and wood surfaces varying in terms of their roughness and were subsequently asked to judge the pleasantness of the surfaces (*feels good or bad?*). Individuals rated the smoother textures as feeling better than the rough textures. The fNIRS activation results revealed an overall increased engagement of the contralateral sensorimotor areas as well as left prefrontal areas. Furthermore, the perceived pleasantness modulated specific activations of left prefrontal areas with increasing pleasantness showing greater activations of these regions, with this positive relationship being most pronounced for smooth woods. Overall, the results of the present study demonstrated that positively valenced touch through active fingertip exploration of material surfaces is linked to left prefrontal activity and additionally extend previous findings of affective touch underlying passive movements on hairy skin.

Keywords: aesthetics, material, fNIRS, affective touch, active touch, texture

Presentation type: Oral presentation / Talk

Session: Experimental Aesthetics Following Fechner's Conceptions II

Visual processing speed, self-reported fatigue and pupillary unrest in post-COVID patients

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Background: Arousal dysregulation is assumed to play a pivotal role in the pathogenesis of fatigue in different syndromes. A high proportion of post-COVID patients suffer from persisting fatigue, attentional and autonomic dysfunction. We assumed that in post-COVID syndrome an underlying hypoarousal would be expressed by a combination of interrelated symptoms on different levels: i.e. reduced attentional alertness at the neurocognitive level, the feeling of mental fatigue at the subjective symptom level and decreased tonic central nervous activity at the neurophysiological level. **Method:** 40 Post-COVID patients and 40 matched controls were assessed. As a neurocognitive measure of arousal we quantified the parameter visual processing speed C (VPS) based on Bundesen's "Theory of Visual Attention" (1990) that reflects the alertness state of a given participant. The subjective symptom level was assessed with the Fatigue Assessment Scale. As a measure of arousal at the neurophysiological level, pupillary unrest (PUI) was assessed via the pupillographic sleepiness test in the post-COVID group. **Results:** We found that VPS was significantly reduced in post-COVID patients compared to healthy controls. Furthermore, regression analysis revealed that self-rated mental fatigue and PUI explained 34% of variance in VPS. **Conclusion**: Our findings corroborate the hypothesis that a virus- or immune-mediated arousal dysregulation in post-COVID patients leads to I) slowing of processing speed at the neurocognitive level, II) reduced arousal at the neurophysiological level and III) a feeling of mental fatigue at the subjective experience level. Further discerning underlying mechanisms and finding treatment strategies by tagerting arousal dysfunction is essential.

Keywords: Post-COVID syndrome, visual processing speed, arousal, alertness, pupillary unrest

Presentation type: Oral presentation / Talk

Session: Advances in TVA-based visual attention research II: Basic and Applied

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Unintentional response priming from verbal action-effect instructions

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Stimulus-response learning is traditionally attributed to repeatedly perceiving a stimulus and expressing a response. Subsequently, the perception of the stimulus can trigger the response automatically (i.e., efficiently, without an in situ conscious intention). With the present studies, we investigated whether processing verbal information that contained a stimulus and a response can result in comparable stimulus-response learning (including the automaticity consequences). In three online studies (N ~ 1000), participants were presented with "action-effect" instructions that included the

information that pressing a specific button (e.g., left; action) will turn the screen background blue (stimulus/effect). Subsequently, participants categorized letters into vowels and consonants by pressing a left or right button. In some trials, the "effect" (blue background) appeared together with the target letter. Consistent with our hypothesis, the categorization responses show a response-compatibility effect: In trials with the effect (blue background) present, there are fewer errors when the required response and action-effect-instruction response overlapped than when they did not overlap. This effect is not present in the control trials (grey background), and there is no evidence for a speed-accuracy trade-off with response times. Additional preliminary data indicates some modulation of this verbally induced compatibility effect by the stimulus-response order, accompanied color information, and the degree of the relationship between the stimulus and response in the verbal instructions. In sum, albeit never directly experienced in that combination, verbal instructions that include a stimulus and a response can lead to associative learning with the consequence that perceiving the stimulus automatically prepares the respective response.

Keywords: action-effect learning, stimulus-response learning, verbal instructions, response priming

Presentation type: Oral presentation / Talk

Session: Binding

Influence of Infant-Directed Speech on Visual Categorization in 4-Month-Olds: An FPVS Study

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At 4 months of age, children are able to categorize human faces at a glance. However, the neural mechanisms behind building distinct categories remain disputed. It has been suggested that the combined information of multisensory input early in life is advantageous to forming categories in context and benefits perceptual development. The current study focuses on the auditory domain by providing participants with infant- or adult-directed speech during visual stimulation. Beyond the finding that children prefer infant-directed speech (IDS), neurobehavioral studies suggest that specific neural mechanisms may mediate the benefits of IDS. Additionally, IDS can serve as an ostensive cue eliciting referential expectations. Fast periodic visual stimulation (FPVS) is employed to investigate the influence of concurrently presented IDS versus adult-directed speech (ADS) on visual categorization. Stimuli are flickered periodically at a fixed rate of F = 6 Hz, with a picture of the target category displayed at every 6th position. To compare the categorization of social and non-social categories, faces and cars will serve as targets in a between-subjects design. EEG activity at the frequency of stimulus presentation (6 Hz and harmonics) and the categorization frequency (1 Hz and harmonics) will be compared. Beneficial effects of IDS over ADS on visual processing, as compared within subjects, are expected. Moreover, it is anticipated that a social target category is more easily recognized than a non-social one when accompanied by

a human voice. This study aims to deepen the knowledge about neural correlates of multisensory processing using an innovative EEG method.

Keywords: Infant-Directed Speech, Categorization, Neural Processing, FPVS, EEG

Presentation type: Poster Presentation

Session: Language

Developing an experimental paradigm to study the impact of error processing on post-response adaptation in perfectionists

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Personal standards perfectionism (PSP) denotes the disposition to strive for flawlessness and excessively evaluate oneself based on the achievement of extremely high performance goals. Neuropsychological studies have linked PSP to indicators of error processing, e.g. increased activity in the anterior cingulate cortex and an increased error negativity peak amplitude in the event-related potential. These links suggest that individuals high in PSP process errors more deeply than individuals low in PSP. When making an error in an experimental task, high-PS perfectionists should thus be able to draw on the information the error provides to avoid future errors and improve their performance (optimisation hypothesis of PSP). However, the empirical evidence for this hypothesis is mixed. We suggest that many of the previous studies investigating the optimisation hypothesis employed experimental paradigms in which errors did not provide the opportunity to improve subsequent behaviour. Hence, even enhanced error processing would not allow to optimise one's performance. To test this suggestion, we developed an experimental paradigm in which an error on trial *n* allows to draw information on what will be the correct response on trial *n* + 1. If individuals high in PSP were to process errors more intensely to optimise their behaviour, they should show increased post-response adjustment in terms of post-error slowing and post-error accuracy compared to individuals low in PSP. Our study will be the first study to test the optimisation hypothesis using an experimental paradigm that has been developed specifically for this purpose.

Keywords: Experimental Paradigm; Perfectionism; Error processing; Cognitive Control

Presentation type: No-Data Poster

Session:

Individual Learning Pathway Mentoring: Evaluating a One-on-One Mentoring for Talented Students

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Although mentoring can facilitate talent development, mentoring interventions need to follow research-based recommendations to be effective (Stoeger et al., 2021). This contribution evaluates the effectiveness of a three-year one-on-one mentoring based on those recommendations (learning pathway mentoring) where teachers mentor students who are particularly interested and high-achieving in a specific domain (school subject). Mentoring dyads use the results of the accompanying support diagnostics to set goals and plan a learning pathway that enables mentees to achieve these goals, which is continually reflected and adjusted during the mentoring. The program included 111 mentoring dyads from 27 German secondary schools. For the evaluation, student data from four measurement points were available: Beginning of the 19/20 school year and end of the 19/20, 20/21, and 21/22 school years (N = 1541; 76 mentees and 1465 non-mentees). Outcomes included the extent of activities, study and career choice intentions, self-concept, and interest regarding the respective mentoring subject. First analyses demonstrate better development of mentees compared to non-mentees from the beginning of the 19/20 school year to the end of the 20/21 school year for all outcomes (controlling for the initial value of the respective outcome and for academic achievement, motivation, and quality of students' learning environment). Most effects were in the upper range of what mentoring interventions typically achieve (d = .34 to d = .68). **References** Stoeger, H., Balestrini, D. P., & Ziegler, A. (2021). Key issues in professionalizing mentoring practices. *Annals of the New York Academy of Sciences, 1483*(1), 5–18. https://doi.org/10.1111/nyas.14537

Keywords: Mentoring, school mentoring, gifted education, talent development

Presentation type: Oral presentation / Talk

Session: Learning and memory retrieval

Effects of 14-h- and 18-h-fasting on task performance and choice in voluntary task-switching paradigm with food stimuli

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Previous research demonstrated that affective stimuli gain accelerated access to attentional resources and that this causes switch costs differences when participants switch between affective and non-affective task-sets in task-switching. The present study aimed to investigate, how food deprivation (i.e. fasting) influenced task performance and choice in voluntary task-switching with neutral digit and affective food stimuli. Participants voluntarily switched between the categorization of simple digits as

odd or even, and the categorization of food images as sweet or savory. The fasting period lasted 14 hours in Experiment 1, and 18 hours in Experiment 2. Experiment 1 demonstrated lower switch costs when switching to the affective food task compared to switching to the neutral digit task in both the fasting and control group. Experiment 2 replicated the results of Experiment 1 and additionally showed that switch costs when switching to the neutral digit task were significantly higher in the fasting group compared to the control group. Our results indicate that independently of hunger, the affective content of the food stimulus leads to faster activation of this task-set in working memory, which results in smaller switch costs when switching to the food task. The observation of larger switch costs for the neutral digit task in Experiment 2 fits the assumption that with hunger more effort is needed to overcome the activation of the food task-set to activate the digit task-set. This effect seems to depend on the level of hunger. No effects were found for task choice and switch rate.

Keywords: voluntary task-switching, switch costs, task-set, food stimuli, fasting, hunger

Presentation type: Oral presentation / Talk

Session: Dual tasks and action control

Sequential collaboration: Aggregating judgments in a dependent, incremental manner

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In recent years, the Internet has become a popular source for gathering and collecting information, especially in online collaborative projects such as Wikipedia or OpenStreetMap. In these projects, collaboration resembles a sequential chain that starts with the creation of an entry followed by a sequence of contributors deciding to adjust or maintain the presented information. As online collaborative projects were found to yield highly accurate information which is often attributed to wisdom of crowds, we examine this sequential collaboration as a process of judgment aggregation. Thereby, sequential collaboration resembles advice taking since contributors encounter judgments of previous participants before deciding whether to adjust or maintain these judgments. In three experiments, comparing judgment aggregation with sequential collaboration and the unweighted averaging of independent individual judgments, we found that judgment accuracy in sequential collaboration increases over a sequential chain and that sequential-collaboration estimates can be more accurate than estimates obtained with unweighted averaging. By allowing contributors to opt-out of providing a judgment, sequential collaboration may foster an implicit weighting of judgments by expertise such that contributors adjust or maintain judgments according to their expertise. We investigated this in three experiments measuring and manipulating contributors' expertise. There we showed that experts improve judgments more than novices resulting in more accurate estimate the more and later experts enter sequential chains. These results yield first insights into sequential collaboration as a mechanism

of judgment aggregation and show that advice taking in the context of sequential collaboration works to the benefit of the resulting judgments.

Keywords: wisdom of crowds, group decision making, mass collaboration

Presentation type: Oral presentation / Talk

Session: Advice taking and beyond: Judgment formation via advice taking, sequential collaboration, and belief updating

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Adapting Information Search through Subjective Confidence and Accumulated Evidence

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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 (combined N=168), in which participants made binary decisions based on self-truncated sampled information and reported their confidence. The first experiment manipulated general confidence levels while the second manipulated decision importance. Participants in the first experiment underwent a trial phase in which one condition received negatively distorted decision feedback while the control 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, on average. Nevertheless, they also reported significantly lower confidence levels, but tended to truncate their decision after a very similar amount of evidence. A regression revealed that higher evidence was positively related with confidence for both conditions, but the distorted-feedback condition needed more evidence to reach the same confidence level as the control condition. The second experiment manipulated decision importance within participants. While participants collected significantly more information for more important decisions, this did not result in higher evidence or higher reported confidence levels. Hence, situational influences may influence how much evidence we need to reach an aspired confidence level, but sample size seems to have an additional effect, which might be maladaptive.

Keywords: sampling, information search, confidence, meta-cognition, self-regulation

Presentation type: Oral presentation / Talk

Session: How agents' cognitive processes shape self-determined information search and the resulting judgements and decisions

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The influence of higher-order action predictions on action perception

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Recent proposals suggest that higher-order knowledge about others' goals and intentions shapes the perceptual experience of their behaviour. To test this idea, we showed participants videos of an actor reaching efficiently, straight towards an object or arched over an obstacle, or inefficiently, straight towards an obstacle or arched over an empty space. The hand suddenly disappeared, and participants indicated its last seen position. Perceptual judgements were consistently biased towards action expectations, such that straight reaches were perceived to have reached higher when there was an obstacle to overcome compared to no obstacle, and arched reaches were perceived lower when there was no obstacle. Importantly, these biases depended (1) on the actor being able to see the scene (instead of wearing a blindfold), and on (2) on the actor's (potentially false) belief about whether an obstacle was present. This shows that action expectations from higher-order processing of theory of mind guide action perception and contribute to the understanding of other peoples' actions.

Keywords: action prediction, action perception, predictive-processing

Presentation type: Oral presentation / Talk

Session: Perceiving and understanding cues in others' actions

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The Significance of Structural Rich Club Hubs for the Processing of Hierarchical Stimuli

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Human experience contains many instances of nested hierarchical stimuli, such as language or actions sequences. The temporal extension of the different levels, reflected in the dynamics of brain regions, may offer a powerful neural organizing principle for hierarchical stimuli. Based on Gollo et al. (2015), we recorded fMRI and diffusion weighted imaging in 40 participants to test the hypothesis of whether structural rich club hubs are at the top of this processing hierarchy. During fMRI, participants were

presented with blocks of digit sequences arranged at different levels of a nested hierarchy. The neurofunctional results showed a general effect of structure bilaterally in the intraparietal area, the left inferior precentral sulcus and the right middle frontal gyrus. Higher levels of structure were associated with more anterior activation in the right superior frontal gyrus. Combining diffusion tensor and generalized Q-sampling imaging approaches, we reconstructed structural networks of the participants and then identified structural rich club hubs in a group average network. To test the correspondence of structure and function, a region of interest (ROI) analysis based on these hub regions and an investigation of the centrality measures of the significant functional clusters were performed. The ROI analysis revealed that activity in the rich club hubs increased with hierarchy levels. Measures of nodal centrality differed among the functional clusters found in the block comparison but did not reveal a consistent pattern. Our results indicate for the first time that structural rich club hubs are involved in the higher-level processing of nested hierarchical stimuli.

Keywords: rich club, hubs, hierarchical processing, connectome, fMRI, DWI, graph theory

Presentation type: Poster Presentation

Session: Memory and working memory

The N2 Proportion Congruency Effect in the Temporal Flanker Task

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Incongruent distractor-target pairs evoke response conflict as indicated by prolonged reaction times and a fronto-central N2 ERP component. Experimental blocks with predominantly congruent trials even yield larger behavioral congruency effects (i.e., proportion congruency effect). Recently, Jost and colleagues (2022) reported a strikingly large, but very consistent N2 congruency effect in a temporal flanker task (essentially a priming paradigm) that was modulated by proportion congruency – a finding that is in contrast to the majority of flanker task studies that failed to yield this effect. Here, we re-examined this finding in another lab with n = 32 new participants and a variation of proportion congruency across three levels (25%, 50%, or 75% congruent trials in a block). Our results confirmed the hypothesized two-way interaction: Congruency effects in the fronto-central N2 varied across the proportion congruency levels, arguably reflecting the degree of cognitive effort required to resolve the response conflict. This assumption is further corroborated by analyses of lateralized-readiness potentials (LRPs), which revealed more distractor-induced response activation under high congruency conditions. Interestingly, congruency effects were not only evident in the N2 component but likewise in a temporally preceding positive peak. Upon closer inspection, the ERP pattern resembles an oscillation on the order of about 7Hz, suggesting that the N2 component at least partially reflects a theta band oscillatory process of the mPFC/ACC. In conclusion, the temporal flanker task in combination with a proportion congruency manipulation consistently evokes target-related N2

congruency effects. Quantifying theta oscillations might be a reasonable avenue for future research.

Keywords: cognitive control, conflict detection, flanker task, N2, theta oscillations, proportion congruency

Presentation type: Poster Presentation

Session: Cognitive control and conflict

The role of objective and introspective switch costs in voluntary task choice

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Human beings are cognitive misers. One facet of this effort avoidance is the reluctance to voluntarily switch tasks when repeating the same task is allowed. Yet participants sometimes voluntarily switch despite the resulting costs. This paradox might be resolved if the individual switching ability or sensitivity is taken into account. Hence, we investigated whether the voluntary switch rate (VSR) is governed by the objective or the subjective (introspective) switch costs. Three experiments (N1=120, N2=100, N3=100) were conducted utilizing voluntary task switching with forced and free task choices intermixed. In Experiments 1 and 3, objective switch costs were measured on forced tasks, and subjective switch costs were calculated from (introspectively) estimated reaction times in a separate phase. In Experiment 2, objective and subjective costs were measured in the same phase. In Experiments 2 and 3, we additionally manipulated the forced switch rate (FSR). Results show that objective switch costs were lower in blocks with higher FSRs and that this subtle modulation was captured by the subjective estimations. Moreover, the objective switch costs predicted the VSR in Experiments 1 and (partially) 3: Participants with higher switch costs switched tasks less often voluntarily. The subjective switch costs predicted the VSR only in Experiment 3 (the lower the subjective costs, the higher the VSR). Hence, the present study offers first insights under which circumstances introspection guides decision-making during voluntary task-switching.

Keywords: cognitive control, voluntary task switching, introspection, mental effort

Presentation type: Oral presentation / Talk

Session: Current directions in free-choice paradigms I: What we can learn from giving more control to the participant

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Musical Dislikes: Rationales, Functions, and Physiological Reactions

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The vast majority of studies on musical taste are based on likes or preferences of certain types of music. A series of studies will be presented, in which the complexity and diversity of musical judgments became obvious, showing that musical dislikes are important for conceptualizing musical taste. The rationales for disliked music were first investigated using in-depth interviews revealing relevant categories of social, music-related, and self-related reasons for the dislike of various kinds of music. A following online survey revealed a structure of the rationales, presenting two latent profiles. A 'highbrow' profile is centered around the rejection of Too Simple music related to Too Mainstream and Not Authentic, all connected to Social Incongruence. This highbrow thinking leads to a despise of (popular) music, which can result in No Impact, or even in active Displeasure. This displeasure seems to be mediated if not caused by a perceived Social Incongruence. A 'lowbrow' profile is centered around Too Niche and Too Complex music, with the first being connected to Displeasure. In another study, bodily reactions to one's disliked music were investigated with measures of psychophysiology, revealing higher arousal responses and facial muscle activity when listening to disliked music in comparison to 'indifferent' music. Physiological arousal is therefore not only an indicator of pleasure evoked by preferred music but also of disliked music. This series of studies shows that focusing musical taste research exclusively on listeners' preferences cannot account for the diversity of aesthetic criteria that underlie everyday evaluations of music.

Keywords: music, aesthetics, dislikes, rejection, musical taste, social

Presentation type: Oral presentation / Talk

Session: Experimental Aesthetics Following Fechner's Conceptions I

Speeding up (and down) expectations: Investigating the influence of experimental context on speed perception

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Motion perception is prone to systematic biases. For example, when asked to localize the onset or offset of a dynamic, moving target, perceptual shifts in, as well as against motion direction can be systematically observed, the so called Fröhlich effect, Onset repulsion effect, Representational Momentum effect, and Offset repulsion effect. Following new theoretical developments, one crucial underlying factor for these localization biases should be expectations regarding stimulus speed. In order to test this prediction, perceptually identical target motion trials are presented and compared across different experimental context. In these experimental contexts, different speed characteristics are realized, eliciting different speed expectations. The data indicate an

effect of experimental context on the localization of dynamic stimuli, and implications for future theoretical developments and current theoretical formulations are discussed.

Keywords: motion perception, speed expectations, localization, Fröhlich effect, Representational Momentum

Presentation type: Oral presentation / Talk

Session: Spatial changes over time: current developments in motion perception

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Missing Evidence for Implicit Recognition: The Indirect Task Advantage in Contextual Cueing

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Studies on unconscious or implicit cognitive capacities often rely on a problematic standard reasoning. For example, in the contextual cueing paradigm, evidence for implicit memory is inferred from a pattern of two results: First, repeated stimulus configurations produce faster mean reaction times (RT) than new ones. Second, when participants are asked directly to discriminate repeated vs. new stimulus configurations, their explicit recognition sensitivity is close to chance. Researchers routinely infer that the recognition sensitivity driving RT effects is larger than the sensitivity of explicit responses—a situation we call Indirect Task Advantage (ITA). Based on this ITA, researchers infer recognition that goes beyond participants' explicit memory, that is, implicit recognition. The problem with this standard reasoning: Sensitivities underlying RT effects are never calculated. An appropriate analysis to establish an ITA is the sensitivity comparison in which sensitivities from the RT data are computed and compared against explicit recognition sensitivity. In a preregistered reanalysis, we apply this appropriate method to 20 studies in the contextual cueing paradigm and find no evidence for ITAs. Thus, the empirical basis for claims about implicit recognition is lacking and interpretations in this paradigm—but likely also in others using the standard reasoning—require serious reevaluation.

Keywords: implicit memory, contextual cueing, indirect task advantage

Presentation type: Oral presentation / Talk

Session: New methodological approaches to measuring unconscious mental processes

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Modulating effects of social comparison on acute responses to traumatic footage and the development of intrusive memories

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Many trauma survivors develop intrusive memories that can be highly debilitating. Although it is well established that the post-traumatic social environment plays a critical role, little is known about the role of social comparison with other trauma survivors. We investigated this using traumatic films and social comparison with a fictive fellow participant, predicting that perceived resilience and similarity of the fellow participant would shift comparison outcomes, negative affect, and the development of intrusive memories. In particular, healthy participants read ostensible testimonials from a fellow participant from a similar background, reporting high levels of PTSD symptoms (i.e. a similar-vulnerable social comparator; n=30), low distress (similar-resilient; n=30) or by a demographically dissimilar person reporting low distress (different-resilient; n=30). A separate no-comparison group (n = 30) served to gauge the presence of assimilative responding. Overall, only subtle effects of social comparison emerged across outcomes. Notably, relative to participants with a similar-vulnerable comparator, those with a the similar-reslient group had lower acute negative affect but not fewer intrusive memories. Relative to participants with a different-reslilient comparator, the similar-resilient group had comparable acute negative affect but tended to have fewer intrusive memories. This talk will discuss the idea that acute affect and intrusion development may be influenced differentially. More broadly, it addresses how a general comparative processing model may serve as a framework to explore social influence on adjustment to traumatic experiences.

Keywords: social comparison; stress; experimental psychopathology; posttraumatic stress disorder

Presentation type: Oral presentation / Talk

Session: The relative self: Social comparison and its implications for cognition, well-being and self-construal

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Cognitive Offloading Impairs Memory Accuracy in an Intention Offloading Task

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Setting reminders has a beneficial impact on fulfilling delayed intentions. For instance, placing the garbage next to the front door might help us to bring the garbage outside the next time we leave the house. However, little is known about the consequences of offloading behavior on memory performance. The present experiment (N=384) addresses the question how offloading intentions affects memory performance for offloaded intentions. The participants performed an ongoing drag-and-drop task with images. For some of the images, the participants were required to fulfill a delayed

intention (i.e., drag-and-drop to a different location). We manipulated whether the participants had to set reminders for the delayed intentions or whether they were not allowed to do so. In a subsequent memory test, we probed recognition accuracy for the handled images. We manipulated whether this memory test was announced before the main task or not. In line with previous research, setting reminders improved the accuracy in fulfilling delayed intentions. However, irrespective of the test announcement, memory accuracy was reduced for images for which associated intentions had been offloaded previously. Therefore, this experiment shows that offloading intentions might interfere with the formation of memory. As a consequence, offloading behavior should depend on situation dependent considerations about this trade-off between immediate task performance (benefits from offloading) and memory formation (suffers from offloading).

Keywords: cognitive offloading, delayed intentions, working memory, prospective memory

Presentation type: Oral presentation / Talk

Session: Forgetting

Neuromodulatory Influences on Missed Cue Errors in the Distractor-Induced Deafness Paradigm

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In the distractor-induced deafness paradigm, an inhibitory process of selective attention leads to a reduced detection rate when the distractors have the same properties as the following target. This inhibitory influence seems to be affected by neuromodulation with caffeine or by total sleep deprivation, but not by tDCS. In addition to detection rate, missed cue error rate also appears to be affected by neuromodulation: Real tDCS led to lower error rates in trials with six distractors compared with sham stimulation, whereas caffeine led to comparable effects in trials without distractors. In contrast, a night of total sleep deprivation led to higher error rates in trials with six distractors. These effects might be explained by a supportive influence of tDCS and caffeine and a hindering influence of sleep deprivation on selective attention.

Keywords: Neuromodulation, Error Rates, Divided Attention, Inhibitory Processes, Distractor Processing

Presentation type: Poster Presentation

Session: Auditory processing

Automatic activation of grip force magnitude during number magnitude processing

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The aim of the study is to research how processing numbers correlates with force production. Participants tend to respond softer to smaller numbers and harder to larger numbers. However, the research on these force-numerical associations is limited and might be confounded. Some studies included explicit task instructions on how to respond, thus activating explicit magnitude information, others did not control for spatial information. In the current study we controlled for explicit task instructions and spatial information with the objective to obtain a “purer” measurement of force-numerical associations. For this, we measured continuous grip force fluctuations during a magnitude comparison task. This rather novel method has the benefit that it does not require active responses and thus measures implicit grip force fluctuations during number processing. The results revealed that smaller numbers induced less force than larger numbers. Our findings suggest that force-numerical associations can exist without spatial influences and are automatic.

Keywords: numerical cognition, force-numerical associations, spatial numerical associations, continuous grip force measurement

Presentation type: Oral presentation / Talk

Session: Number processing

Punishment, fast and slow: Effects of deliberation on moral punishment

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Three experiments were conducted to test how moral punishment is affected by deliberation. The intuitive-morality view predicts that moral punishment should increase under time pressure and decrease with deliberation. Moral punishment was examined in a simultaneous one-shot Prisoner’s Dilemma game with a costly punishment option. The players cooperated or defected and then decided whether or not to punish their partners. In Experiment 1, the punishment decisions were made under time pressure or under no time pressure. In Experiment 2, the punishment decisions were delayed by pauses in which participants deliberated their decisions or worked on a demanding distractor task. In Experiment 3, participants were asked to deliberate on fairness or on their self-interests before deciding whether to punish their partners. Different types of punishment were distinguished using a multinomial model. In Experiment 1, time pressure decreased moral punishment. In Experiment 2, deliberation increased moral punishment. However, Experiment 3 showed that the effect of deliberation depended

on the topics that were deliberated. When participants thought about their self-interests rather than about fairness, cooperation and moral punishment decreased and antisocial punishment increased. The results suggest that spontaneous deliberation increases moral punishment but the effects of deliberation are modulated by the type of deliberation that takes place.

Keywords: cooperation, punishment, cognitive resources, deliberation, multinomial modeling

Presentation type: Poster Presentation

Session: Moral decisions and social interaction

Force- and Space-Related Associations in Number Processing

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BACKGROUND Many studies demonstrated associations between smaller numbers and left space as well as larger numbers and right space. Almost all previous studies used lateralized motor (i.e., left or right) responses, and there is little evidence that these associations appear when no lateralized motor response is required. It raises the question of whether such associations are an intrinsic part of number semantics or emerge at the response stage. METHOD We recorded passive holding grip forces during processing of small numbers (from 1 to 4) and large numbers (from 6 to 9) in two experiments. In Experiment 1, participants performed a shallow task ("Is it a number or a letter?"); in Experiment 2, a semantically deeper magnitude judgment task ("Is this number larger or smaller than five?") was performed. RESULTS Although we instructed participants to keep their grip force constant, it spontaneously changed in both experiments: In the numerical decision task, smaller numbers led to a greater force increase in the left than in the right hand. In the magnitude judgment task, smaller numbers increased the left-hand holding force, and larger numbers increased the right-hand holding force. This effect emerged earlier and lasted longer than in the shallow task. DISCUSSION For the first time, we demonstrated spatial associations of numbers in passive holding force. Our results suggest that (1) spatial-numerical associations can emerge without an instructed motor response and (2) the timing and strength of such associations depend on the cognitive task.

Keywords: SNARC, Mental number line, Number processing, Embodied cognition, Grip force, Motor system

Presentation type: Oral presentation / Talk

Session: Cross-dimensional compatibility effects between quantities, valence and space: Points of convergence and points of divergence

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You smile and I do not reply. Timing and voluntary suppression of forced smiles towards disliked targets.

Vanessa Mitschke

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The ability to control emotional facial reactions towards interaction partners is an important asset to foster or hinder affiliation. While smiling at positive targets takes no effort, smiling towards outgroups, disliked others and competitors has been shown to be effortful and more often suppressed. In a series of two studies (N=80), we investigated a potential inhibition advantage, indexed via a greater action restraint of emotional facial reactions, towards targets previously paired with negative behavior compared to targets previously paired with good behavior. Analysis of facial muscles via EMG during a facial reaction Go/NoGo task revealed significantly less commission errors towards negative targets. The analysis of the overall muscle activation over time during NoGo trials also reveals a weaker overall magnitude of congruent muscle responses towards the negative target. The results indicate that irrespective of being task irrelevant, the personal attitude towards the target modulated facial responses resulting in stronger congruent reactions towards positive targets.

Keywords: emotion, face, inhibition

Presentation type: Oral presentation / Talk

Session: Emotional faces in social cognition: New approaches and recent insights

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Stop Right There: The Role of Binding and Retrieval in Action Termination

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While binding and retrieval have been proposed as essential to the construction of action plans, we explore how these and related processes might also be involved in the deconstruction of action plans. In short, what happens to action plans when they are no longer to be executed? Situations in which deconstruction of action plans is necessary include aborting an action already in progress, stopping an action just before it is to be executed, or discarding an action plan long before its execution. We investigated the latter situation in an ABBA design by having participants plan an action A but perform another action B before action A. Typically, performance in action B is impaired if it partially overlaps with the plan for action A that has not yet been executed (compared to no overlap). Importantly, after a sufficiently long action A planning interval but before action B, a signal indicated whether action A should still be executed after action B (75%) or not (25%). When the plan for action A had not been discarded, we found the typical partial overlap costs in action B, indicating retrieval of features from action plan A. However, in trials where action plan A had been discarded before action B, we found

clear signs of action plan dismantling in the form of feature unbinding. These results suggest that not only action plan construction but also deconstruction builds on the principle of feature binding.

Keywords: unbinding, event file, action plan, action control

Presentation type: Oral presentation / Talk

Session: Recent advances in binding and retrieval in action control II: Discarded action plans, event segmentation, and boundaries

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Putting the past behind: Dissociate whether control states at the level of task-set or response-conflict help to disengage from a no longer relevant task

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University of Greifswald

In a task switching setting, participants are required to maintain two different task sets in working memory but to engage in only one of the tasks in each trial. Curiously, if one of the tasks is labeled irrelevant, performance in the remaining task is still worse than when the same task is performed in a single-task context. This so-called fade-out cost demonstrates that the suddenly irrelevant task cannot be discarded directly (Mayr & Liebscher, 2001). In the present study, we used list-wide proportion manipulations to induce two different control states (a) at the task-set level by manipulating the proportion of task switches (Experiment 1) and (b) at the response-conflict level by manipulating the proportion of response congruency (Experiment 2) in a task switching experiment with a subsequent fade-out part. If fade-out costs originate at the task-set level, fade-out costs should be smaller following many repetitions compared to many switches in Experiment 1. If fade-out costs originate at the response-conflict level, fade-out costs should be smaller following many incongruent compared to many congruent trials in Experiment 2. Preliminary data of Experiment 1 indicate reduced fade-out costs after blocks with many repetition trials compared to many switch trials suggesting that fade-out costs derive at the task-set level. If this is the sole source of fade-out costs, we expect that in Experiment 2 the congruency manipulation will not affect the size of fade-out costs. Data collection is still ongoing, but complete data will be presented at the conference.

Keywords: cognitive control, control states, switch proportion, response congruency proportion, fade-out costs, task switching

Presentation type: Poster Presentation

Session: Cognitive flexibility

Memory and Listening Effort in Conversations: The Role of Spatial Cues and Cognitive Functions

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Conversations involving three or more people often include phases where one conversational partner listens to what the others are saying and has to remember the conversational content. It is possible that the presence of speech-related auditory information, such as different spatial positions of conversing talkers, influences listener's memory and comprehension of conversational content. However, in cognitive-psychological experiments, talkers' audio signals are often presented diotically, i.e., identically to both ears as mono signals. This does not reflect face-to-face conversations where two talkers' audio signals never come from the same spatial location. Therefore, in the present study, we examine how the spatial separation of two conversing talkers affects listener's short-term memory of heard information and listening effort. To accomplish this, participants were administered a dual-task paradigm. In the primary task, participants listened to a conversation between a female and a male talker and then responded to content-related questions. The talkers' audio signals were presented via headphones at a distance of 2.5m from the listener either spatially separated (+/-60°) or co-located (0°). In parallel to this listening task, participants performed a vibrotactile pattern recognition task as a secondary task, that is independent of both auditory and visual modalities. In addition, we measured participants' working memory capacity, selective visual attention, and mental speed to control for listener-specific characteristics that may affect listener's memory performance. We discuss the extent to which spatial cues affect higher-level auditory cognition, specifically short-term memory of conversational content.

Keywords: dual-task, short-term memory, listening effort, spatial position, cognitive functions

Presentation type: Oral presentation / Talk

Session: Memory, Speech and language processing

Contextual Discriminability Affects Successful Retrieval of Stimulus-Response Episodes

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Based on the *event segmentation theory* (Zacks et al. 2007), the on- and offset of an external context demarcates the beginning and end of a so-called event, temporally structuring the ongoing stream of stimulation in the environment. Following this notion,

the present study is concerned with the role of context in structuring sequences of perception-action couplings (so-called *stimulus-response* or *S-R episodes*) in memory. If context also structures sequences of S-R episodes, successful retrieval of an individual episode should be impaired when multiple episodes share a context, presumably due to an increased likelihood of confusing jointly retrieved episodes as compared with a condition in which retrieved episodes are associated with different contexts. This hypothesis was tested by manipulating contextual discriminability on S-R binding and retrieval in an auditory negative priming paradigm with sequences of three successive presentations (i.e., pre-prime, prime, and probe) in each trial. In each presentation, participants identified a target sound accompanied by distractor via a keypress. Sine tones (300 Hz/600 Hz) served as context. Context tones either encompassed pre-prime and prime or changed after the response to the pre-prime target, resulting in conditions with *low* and *high discriminability*, respectively. No context was presented during the probe. Increased erroneous probe responding with the former prime response in trials with a distractor-to-target repetition was taken as indicator of S-R binding and retrieval. The increase in S-R binding and retrieval was stronger in the high- than in the low-discriminability condition, suggesting the organization of S-R episode sequences by context.

Keywords: event segmentation, contextual discriminability, S-R binding, memory

Presentation type: Oral presentation / Talk

Session: Recent advances in binding and retrieval in action control II: Discarded action plans, event segmentation, and boundaries

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Effects of Dynamic Distractors on the Time Course of the Accessory Simon Effect in Vision and Audition

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University of Passau

Lateralized responses to non-spatial features of a stimulus are slowed-down when the stimulus is presented contralaterally as compared with ipsilaterally to the response side. Although this so-called *Simon effect* is found in vision and audition, a decreasing Simon effect with increasing response time levels, typically reported for the visual domain, is usually not found in the auditory modality, suggesting modality-specific mechanisms underlying spatial response conflicts. The present study investigated whether the more persistent Simon effect in the auditory modality is due to the dynamic characteristic of auditory as compared with visual stimuli, with the former typically changing over time. In an auditory (Experiment 1) and a visual (Experiment 2) accessory variant of the Simon task, a lateral distractor occurred prior to or simultaneously with a central target. Participants responded to the identity of the target via keypress and encountered *dynamic* (visual/auditory noise) and *static* (sine tone/checkerboard pattern) distractors. The analysis of averaged response times and error rates was supplemented by distribution analyses. An overall Accessory Simon Effect (ASE) was obtained in both experiments. Importantly, the time course of the ASE was comparably affected by

distractor type in both modalities, decreasing less across SOAs with dynamic as compared with static distractors. Together, the findings are in line with the notion that (1) common mechanisms underly the ASE in vision and audition and that (2) the time course of the effect can be similarly affected by temporal stimulus characteristics in both modalities.

Keywords: Simon effect, action control, modality, conflict

Presentation type: Oral presentation / Talk

Session: Dual tasks and action control

Spatializing serial order WM as a determinant of mathematical abilities

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Mathematical abilities are closely related to spatial processing (e.g.Cheng & Mix, 2014). Currently it is unknown where this relationship comes from. Here we test two potential origins: the spatial mental representation of numbers and the spatial organization of our working memory (WM). A popular task to measure the spatial nature of someone's number representation is parity judgement (Dehaene et al., 1993). Here it is typically observed that participants are faster to give left-sided responses to small numbers and right-sided responses to large numbers (i.e. the SNARC effect). To measure the spatial organization of (verbal) WM, van Dijck & Fias (2011), developed task where subjects had to categorize words (e.g. fruits or vegetable) that were serially stored in WM by giving left or right responses. They observed that faster left-sided responses were given to words from the beginning of the sequence, and faster right-sided responses to words from the end of the sequence. This effect was named the 'ordinal position effect' (OPE), and to our knowledge, the relation between this effect and mathematical abilities remains to be investigated. In a series of behavioural studies we investigated the relationship between various mathematical abilities (mental arithmetic, word problems, algebra, fractions and geometry) and the SNARC and the OPE effect. It was found that the OPE effect correlated with mathematical abilities, word problems and fractions in particular. The SNARC effect didn't correlate with any of the math measures. It can be concluded that structuring WM in a spatial manner supports performing mathematics.

Keywords: Cognitive development, Cognitive skills and processes, Mathematical Cognition, Spatial cognition, Working Memory

Presentation type: Oral presentation / Talk

Session: How spatial are numbers?

Touch and hand movements: optimal integration and biased combination

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In this talk I will present past and recent studies on the interplay between hand movement and touch. If we slide our hand on a surface that is world stationary, the velocity of slip motion provides an auxiliary motion cue that is optimally integrated with other proprioceptive cues. Consider a second case: the surface is occasionally moving, and we are requested to evaluate its motion status. In this second case, the information between proprioception and touch are not redundant. In this second case their combination will give rise to surprising illusions. These two cases can be predicted by optimal models.

Keywords: haptics, reaching, slip motion, touch

Presentation type: Oral presentation / Talk

Session: Touch in context: from the body to the external world

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Adaptation impedes perturbation detection in grasping

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Humans continuously adjust their actions to deal with a dynamic environment. For example, we correct for motor errors or perceptual misjudgements in a process called sensorimotor adaptation, which can occur both with the actor detecting (explicitly) and not detecting it (implicitly). Experimentally, sensorimotor adaptation is often studied by creating mismatches between sensory channels by applying perturbations to one sensory modality. In our experiment, we investigated how the size of the perturbation and the error signal (dissociated by using either a sinusoidal perturbation function or a step function) each contribute to the detection of the perturbation by the participant. Specifically, participants were asked to grasp cuboids of different lengths in a mirror-setup allowing us to present different sizes for seen and felt cuboids, respectively. We used a 2AFC task to assess when participants noticed these mismatches and applied a linear state-space model to the maximum grip aperture, modelling error-correction and its retention. We found larger just-noticeable differences (JNDs) when perturbations follow a sinusoidal compared to a step function, consistent with the idea that reduced error signals following adaptation make it harder to detect perturbations. However, no corresponding difference was found in the error-correction parameter, and a weak correlation with the JNDs. Dissociating the visuo-haptic mismatch and the error signal of perturbations using sensorimotor adaptation provides insights into what makes participants aware of sensory perturbations. Knowing when participants know that an

action has been perturbed will allow us to get a better understanding of when error correction may be under cognitive control.

Keywords: visual perception, haptic perception, perception and action, grasping, sensorimotor adaptation

Presentation type: Poster Presentation

Session: Motor and action control

Audio-Visual Integration in Anticipation: The Role of Context Information and Task Requirements

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Friedrich Schiller University, Jena

In general, research on anticipation in sports (see Cañal-Bruland & Mann, 2015; Loffing & Cañal-Bruland, 2017) has targeted the role of visual information processing in anticipating others' actions. In contrast, the role of auditory information and its multisensory integration with additional sensory modalities has only recently received attention. In this talk we will first review work on the role of auditory information in anticipating ball trajectories and speed judgments in tennis, covering both the effects of racket ball contact sounds (Cañal-Bruland et al., 2018) and of grunting accompanying players' strokes (Müller et al., 2019). We then turn to highlight recent work testing whether such multisensory integration effects on anticipation are dependent on the specific context (e.g., tennis rallies) or are driven by universal principles of perceptual processing (Cañal-Bruland et al., 2022). Finally, we will present studies using continuous behavioral measures (i.e., finger tracking) in multisensory anticipation paradigms and discuss their use in charting the time sensitivity of multisensory integration.

Keywords: context, auditory perception, multisensory integration, anticipation, sport, tennis

Presentation type: Oral presentation / Talk

Session: Perception and Action in Sports

Interactive changes between cognitive control and reward sensitivity do not influence unhealthy behavior in adolescence

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During adolescence, maladaptive risk behaviors such as alcohol, tobacco, and marihuana use increase. It has been suggested that interactive changes in reward sensitivity and cognitive control during adolescence condition changes in the propensity to engage in risky behavior. However, longitudinal data have been largely lacking to test such hypotheses. We used longitudinal data (two measurement time points, over two years) from an adolescent sample (N = 191) aged 9-19 years to examine whether changes in reward sensitivity and/or cognitive control are associated with changes in maladaptive risk behaviors (alcohol, tobacco, and marihuana use). Multiple behavioral tasks were used to assess reward sensitivity (Balloon Analog Risk Task [BART], Stoplight, Treasure Hunting Task [THT]) and cognitive control (Task Switching, Go/NoGo, Working Memory). The measurement model of reward sensitivity indicated that the three reward tasks could not be subsumed under a single factor. Results from separate models with behavioral tasks as manifest variables for reward sensitivity showed that adolescents did not engage in more maladaptive risk behaviors with age. However, cognitive control and reward sensitivity increased, and these changes were partially related. Specifically, adolescents with higher baseline levels of reward sensitivity (BART) showed fewer changes in cognitive control, whereas adolescents with higher baseline levels of cognitive control tended to be less likely to change in decisions under known gains (THT). The results showed that changes in cognitive control and reward sensitivity were related, but not to changes in unhealthy behavior, possibly because the developmental period covered in our sample was not large enough.

Keywords: adolescence, risk, cognitive control, reward sensitivity

Presentation type: Poster Presentation

Session: Health and environment

How does correct and incorrect explainable artificial intelligence affect visual search?

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Artificial intelligence (AI) often acts like a black box. To achieve more transparency, explainable artificial intelligence (XAI) can reveal what inputs the AI relied on to make its decision. For instance, in visual quality control, XAI can highlight which image areas were abnormal. While XAI can foster trust, some studies suggest that people comply with false explanations. We investigated how the effects of XAI on human performance depend on whether the AI is correct or what kinds of error it makes. Simulating quality control in a chocolate factory, participants had to decide whether moulds with chocolate bars contained faulty products. Before each image, they were informed whether the AI had classified it as faulty or intact. In half of the experiment, this decision was justified by XAI, presenting visual highlights to mark the fault area. Besides correct AI decisions, there also were occasional misses, false alarms, and misplaced highlights where an

intact chocolate bar was highlighted while the actual fault was located elsewhere. We measured reaction times, errors, and eye movements to assess participants' visual search process. Overall, XAI led to faster performance. However, participants committed more errors with XAI than without for misplaced highlights when the actual fault was elsewhere. In this situation, they often checked the XAI highlight, determined that the area was intact, but then failed to search the rest of the image. These results suggest that while people do not uncritically trust XAI, sometimes they merely check its specific suggestion but do not thoroughly consider alternatives.

Keywords: explainable artificial intelligence, fault detection, visual search, eye movements

Presentation type: Poster Presentation

Session: New media and machine interaction

Scene Affordance Understanding is Impacted by Anchor Objects

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We move through environments and interact with objects constantly. The scenes we interact with are thereby not separated from us; we are agents in the world we experience. In line with this notion, scenes are suggested to be best categorized by the actions they afford: their functions or affordances (Greene et al., 2016). However, scenes are not holistic entities; they can be separated into meaningful clusters ("phrases") consisting of an anchor object around which other objects are located (e.g., soap positioned on top of the sink; Vo, 2021). Anchor objects are important for visual search, but their role in affordance understanding is unclear. In the current study, we explore the influence of action related and unrelated anchors on scene affordance understanding. For a given target action (e.g., taking a shower), we presented indoor scenes in which we either masked an action related anchor (shower), an action unrelated anchor (sink), or a random non-anchor object (mirror). Participants then performed a lexical decision task on pseudo-words vs. action-words, the latter of which could be either consistent (a bathroom and the action showering) or inconsistent (a living room and the action showering) with the presented stimulus. Reaction times were fastest when both anchors were visible and the stimulus was consistent with the word. The contrast between conditions in which action related and unrelated anchors were masked was not significant. The fact that an anchor's absence impacts the lexical access to action words suggests that anchor objects impact scene affordance perception and understanding.

Keywords: scene perception, object perception, anchor objects, affordances

Presentation type: Poster Presentation

Session: Scene perception

Feature binding and retrieval in younger and older adults - a systematic comparison

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Binding and retrieval are considered two central processes of action control. Hereby, binding refers to the integration of features into an event file that occur in a stimulus-response episode. Retrieval, in turn, occurs when one of the features involved is repeated. If features of the previous and the current episode only partially match, a conflict between the retrieved previous and the current response must be resolved, resulting in performance costs: the binding effect. Based on this, interindividual differences in binding behavior have been linked to age- and disorder-related phenomena. For example, older people and children have been found to show larger binding effects than younger people, and similar patterns have been reported for Tourette's patients versus non-clinical samples. However, according to recent approaches, the processes of binding and retrieval occur independently. This raises the question to which processes the observed interindividual differences can be attributed to: Binding, retrieval, or both. Aiming to distinguish between these components, we will present data of an online study in which two age groups (20-30 and 50-70 years) completed three types of tasks that should lead to binding effects: A non-specific binding task, a salience-oriented binding task to manipulate the binding component, and a task with variable onset times in the probe to manipulate the retrieval component. Here, we expect differences in terms of binding and retrieval behavior between the two age groups. The results are discussed in terms of possible influencing factors such as fluid and crystalline intelligence, age-related neurophysiological changes, and cognitive strategies.

Keywords: feature binding, feature retrieval, age comparison

Presentation type: Poster Presentation

Session: Stimulus-response and response-effect binding

Overcoming the Aggregated Learning Curve: A Bayesian Hierarchical Modeling Approach to Measure Learning Processes

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Inference in psychological research is often made based on group level data which is aggregated across participants. While this practice is useful to compare general characteristics between groups, it can also draw a misleading picture about processes on the individual level if the properties of the group data do not equal those of the individual data. As has been recognized previously, this is particularly problematic when looking at learning processes (e.g., Estes, 1956; Gallistel, 2004): whereas aggregated learning curves often suggest a gradual increase over time, individual learning curves can be step-like, but show variability in when learning begins. As we point out for the example of repetition learning, this can also lead to misconceptions about the cognitive mechanism underlying the observed data. To overcome this fallacy, we introduce a Bayesian hierarchical modeling approach to model learning curves on the individual level. Our model focuses on three characteristics of the individual curve: 1) Is learning happening at all, 2) When is learning happening, and 3) How fast is learning happening. Whereas this provides a more fine-grained description of individual learning curves, the hierarchical nature of our approach also allows to compare these characteristics about the learning process on the level of groups. As we show in examples from repetition learning experiments, our model allows to compare learning processes on a high resolution between individuals and can provide a better understanding of the mechanisms underlying observed differences. We discuss the applicability of our approach to a broader range of learning tasks.

Keywords: Modeling, Learning, Bayesian

Presentation type: Oral presentation / Talk

Session: Learning and models

Exploring Source Memory to Understand the Mechanisms of JOL Reactivity

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Past research has evaluated participants' understanding of their memory by soliciting judgments of learning (JOLs). Importantly, JOLs sometimes change memory for the judged material, leading to JOL reactivity. The cue-strengthening account (Soderstrom et al., 2015) and changed-goal account (Mitchum et al., 2016) propose different mechanisms that lead to JOL reactivity. In the present accepted-in-principle registered report, we will collect measures that can provide further insight into these mechanisms. Specifically, participants will study related and unrelated word pairs in different colored fonts for a source recognition test. Across three experiments, the data will be analyzed using a hierarchical Bayesian model of multidimensional source memory to determine how JOLs impact item and source memory for related and unrelated items. In Experiment 2, we will also compare the effects of making JOLs to making judgments of relatedness (JORs), and Experiment 3 will examine how JOLs impact study time allocation. If pair relatedness causes reactivity as the cue-strengthening account predicts, then JOLs and JORs should strengthen item memory and specifically

relatedness source memory for related items. Alternatively, if JOLs cause participants to shift their learning goals, then participants should prioritize related pairs while studying. This would result in JOLs increasing study time (Experiment 3) and strengthening item memory for related pairs but reducing study time and item memory for unrelated pairs. The results of these experiments will provide a more direct test of how JOLs affect specific details in memory and study decisions to better examine the mechanisms that drive JOL reactivity.

Keywords: JOL reactivity, metamemory, learning

Presentation type: Oral presentation / Talk

Session: Source Memory

Do warnings eliminate the truth effect for mock tweets that appear to differ in source credibility?

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The illusory truth effect is the effect that familiar statements, i.e., statements that people have read or heard before, are more likely to be considered true compared to unfamiliar statements. This effect has serious implications for the real world. For example, it implies that misinformation circulating on social media gains credibility by repeated exposure. Thus, the question arises whether the truth effect can be prevented by warning people about the effect. In prior studies, attempts to eliminate the truth effect by warnings had limited success (Nadarevic & Aßfalg, 2017; Calio et al., 2020). More specifically, warned individuals were able to reduce the effect but failed to eliminate it. However, these studies lacked external validity as the statements were presented in isolation, i.e., without any alternative cue that might have helped participants judge a statement's truth. Therefore, we aimed at testing the effectiveness of warnings against the truth effect in a simulated social media context (here: a simulated Twitter feed) that involved alleged source credibility as an alternative cue for truth. Yet, even in this more contextually rich setting, our findings were similar to those of the previous studies. That is, warned participants showed a smaller truth effect compared to a control group but were unable to eliminate the effect. Moreover, although both experimental groups included source credibility in their truth judgments, warnings against the truth effect did not increase reliance on source credibility.

Keywords: truth effect, source credibility, warnings, judgment cues, social media

Presentation type: Oral presentation / Talk

Session: Misinformation Research - Quo Vadis?

Given the option, people avoid incongruent responses in a dual-tasking situation

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While past work on how people can optimize dual-tasking has focused on strategic timing (i.e., when to select responses), little is known about the extent to which people can optimize dual-tasking by taking care of which responses they select. Here we test whether spatial (in)congruency influences response selection in free-choice trials. In two experiments, we combined two visual-manual tasks with spatial stimulus- and response characteristics: Participants responded to the stimulus words “left” and “right” in a forced choice task and responded “up”, “down”, “left” or “right” with an arrow-key to either a free choice prompt or an X located at the respective position. In Experiment 1, participants reduced the proportion of incongruent pairs of responses (i.e., left in one and right in the other task). In Experiment 2, we found that such flexibility in response selection also holds in more constrained environments: Within runs of four trials the free-choice options were continuously reduced based on the responses already given. The combined results of Experiments 1 and 2 suggest that response selection in free choice trials is driven by performance optimization beyond response conflict.

Keywords: Dual-tasking, Free choice, Task congruency, Task interference

Presentation type: Oral presentation / Talk

Session: Current directions in free-choice paradigms II: What we can learn from giving more control to the participant

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Relating Objective Complexity, Subjective Complexity and Beauty

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The complexity of images critically influences our impression of them and our assessment of their beauty. However, there is no consensus on the best way to formalize an objective measure of complexity for images. Moreover, studies relating subjective assessments of complexity and beauty to objective measures are hampered by the use of hand-crafted stimuli, inhibiting generalization. To tackle these issues, we generated 2D black-and-white patterns using cellular automata, collected ratings of their subjective complexity and beauty from 80 participants, and assessed the relationship between these ratings and objective measures of complexity (density, asymmetry,

entropy, local spatial complexity, Kolmogorov complexity). We also introduced “intricacy” which quantified the number of components in patterns using a graph-based approach. We found that a weighted combination of local spatial complexity and intricacy was an effective predictor (R^2test=0.46) of subjective complexity. This implies that people’s complexity ratings depend on the number of distinct elements in the pattern along with their local spatial distribution – complexity judgments are therefore determined by integrating global and local image features. Furthermore, we found a positive linear relationship between beauty and complexity ratings, with a negative linear influence of disorder, namely asymmetry and entropy, and a negative interaction between the two (R^2test=0.64). This implies there is beauty in complexity as long as there is sufficient order. Lastly, we found some evidence for individual differences with subjects displaying varying degrees of preference towards intricacy (in their complexity assessments) and dislike of disorder (in their beauty assessments).

Keywords: empirical aesthetics, cellular automata, objective complexity, subjective complexity, beauty

Presentation type: Oral presentation / Talk

Session: Experimental Aesthetics Following Fechner's Conceptions II

Do linguistic structures acquired via statistical learning inform judgments of learning?

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The ability to extract regularities from the environment, known as statistical learning (SL), facilitates the processing of complex stimuli. At the same time, studies have shown that people’s assessments of their own learning and memory – judgments of learning (JOLs) – are based on cues that pertain to the study materials (e.g., word frequency), or that signal ease during the learning process (e.g., fluency). However, whether linguistic structures acquired via SL are used as cues to inform JOLs has not yet been addressed. In a first experiment, we will test the impact of regularities in the co-occurrences of syllables within artificial words on JOLs. N = 90 participants will be exposed to a continuous auditory stream of artificial words with transitional probabilities between adjacent syllables. Afterwards, they will study and make JOLs for items that follow the transitional probabilities and were presented in the stream (i.e., words) vs. not presented in the stream (i.e., phantom words) and for items that do not follow the transitional probabilities and were not presented in the stream (i.e., non-words). As a manipulation check of SL, one group of participants (n = 45) will be asked whether the item belongs to the language from the auditory stream or not before making each JOL. We expect that if SL occurs, items following the transitional probabilities will receive higher JOLs and recognition memory performance. This study will provide insights into whether cues for metacognitive judgments can be learned through the extraction of regularities from the environment.

Keywords: Metamemory, Judgments of Learning, Statistical Learning, Metacognition

Presentation type: Poster Presentation

Session: Memory and working memory

Generalizability of binding in complex action sequences: (How) are action slips integrated with a previous correct response?

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Binding processes play an important role in the coordination and control of action sequences. It has been shown that binding and retrieval are not restricted to successful actions, but that there in fact is binding of stimulus features and features of the intended but not actually executed response (goal-orientated binding; Foerster et al., 2021). As recent findings indicate binding and retrieval between different individually planned and executed sequential actions (R-R binding; Moeller & Frings, 2019a), it is possible that similar holds for erroneous action sequences. It is yet unclear how erroneous actions are represented within a larger action sequence and how they influence the representation of the correctly executed parts. In this experiment we will investigate, if principles of binding for discrete action slips generalize for erroneous response aspects in complex actions. Participants will respond to individually presented letters and numbers, with four responses each assigned to two stimuli. We then will use sequential analyses of erroneous action episodes to analyze response times and error rates of trial n after an erroneous trial n-2. The results will reveal whether and how an action slip is integrated with a previous correct response (goal-based binding, co-activation-based binding, no binding of incorrect with preceding correct responses). Overall, the study will provide insight into binding as an adaptive mechanism within erroneous action episodes.

Keywords: Action control, Action slips, Error processing, Binding and retrieval, Response–response binding

Presentation type: No-Data Poster

Session:

The Role of Evaluation Goal and Response Labels in Facial Muscle Responses to Prejudiced Groups

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Do we frown faster and smile slower in response to members of a prejudiced group? Based on prior research we expected that participants react faster when intentionally contracting the corrugator muscle in response to obese persons than to slim persons whereas we expected faster contractions of the zygomaticus muscle in response to slim persons rather than to obese persons. To detect such differences, we developed a facial Implicit Association Test (IAT) that required participants to respond with either contractions of the zygomaticus or the corrugator muscle to photos of obese or slim persons and to positive or negative adjectives. The latencies of these muscle responses were assessed by electromyography (EMG). In Experiment 1, we additionally recorded manual responses in an IAT that assessed attitudes towards obese and slim persons. Although we obtained evidence that participants held negative associations towards obese persons in the manual IAT, the facial IAT responses to obese persons were not faster with the corrugator muscle than responses to slim persons and responses with the zygomaticus muscle were not faster to slim persons than to obese persons. Faster responses with the corrugator to obese than to slim persons and with the zygomaticus to slim than to obese persons were obtained in Experiment 2 that used affective response labels for the muscle responses. Thus, if a compatibility effect of facial responses towards a social group is obtained, crucially hinges on the task and on the response labels.

Keywords: Prejudice, Electromyography, Implicit Association Test, Negative Association Towards Obese

Presentation type: Oral presentation / Talk

Session: Implicit testing

Social Influence of Virtual Characters on Pain Perception and Presence

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Pain is a multidimensional phenomenon and laboratory studies could show that verbal support can reduce pain. Virtual reality (VR) is a powerful tool to distract from pain, e.g., through higher presence. However, the potential of social pain modulation in VR is unclear. Furthermore, it is unclear what features of virtual characters impact social influences on users. In a mixed design, healthy participants (N = 97) underwent four within-conditions in VR. In two conditions, virtual characters differing in number of social cues (low: static figure, high: virtual human) provided verbal support during pain stimulation. In two other conditions, no support was provided, but in one condition neutral words were read aloud. Agency of the virtual characters served as between-subjects factor. In the avatar group, participants were led to believe that another participant controlled the virtual characters. In the agent group, participants were told

that they interacted with a computer. In fact, in both groups the virtual characters were computer-controlled. Three heat pain stimuli were applied per condition. Pain ratings, presence ratings and psychophysiological measurements were recorded. Conditions with support compared to no support reduced pain intensity and unpleasantness, albeit with smaller effects than studies with real humans. More social cues led to less pain unpleasantness and higher presence. Agency had no impact. This means that independent of the perceived agency, virtual characters providing verbal support can reduce pain. Social cues affected not only pain, but also presence, indicating beneficial effects of more human visual appearance on social pain modulation in VR.

Keywords: Virtual reality, virtual characters, social support, pain perception

Presentation type: Oral presentation / Talk

Session: Human machine interaction and social cognition

How Does Cognitive Load Influence Recollection of True/False Information?

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Dual-recollection theory (Brainerd et al., 2015) has been recently successfully applied in the research on memory for truth and falsity (Niedziałkowska & Nieznański, 2021) showing better context recollection for truth than falsity. The theory recognizes two types of recollection (context and target) and a univariate process - familiarity. In the literature on the memory representation for truth and falsity, cognitive load manipulation has been applied to test competing models since they predict different effects of load on memory for true vs. false feedback. Consequently, we investigated how cognitive load affects the processes distinguished in the dual-recollection theory operating during the memory for truth and falsity task. Concurrent tasks used to introduce load aimed to impair one of the mechanisms of the maintenance of verbal information:(a) rehearsal, by asking participants to repeat syllables after each learned sentence or (b) refreshing, where choice-reaction task was implemented. Rehearsal and refreshing impairments are assumed to differ in their impact on recollection and familiarity processes (Abadie & Camos, 2019). The results showed better context recollection for truth comparing to falsity in the control and rehearsal-interference group. Moreover, context recollection for truth was better for control group, compared to both groups with cognitive load applied. In the no-load condition target recollection for truth was better than for falsity, and in the refreshing-interference condition target recollection for falsity was better compared to control group. Our results showed that cognitive load affects memory for truth/falsity mainly by reducing the contribution of context recollection to memory of truth feedback.

Keywords: Distraction, Recollection, Familiarity, Falsity, Dual-Recollection Theory, Multinomial Modelling, Truth Bias

Presentation type: Oral presentation / Talk

Session: Source Memory

The flexibility of sampling's positive impact on evaluation

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In a recent series of studies, we replicated approach-avoidance effects, whereby merely approaching a stimulus leads people to evaluate it more positively, within a valent environment in which participants were given genuine autonomy over which stimuli they chose to approach. Specifically, sampling a stimulus more often predicted increased liking of the stimulus, regardless of whether it was consistently paired with positive or negative images. The current experiment tests the malleability of this effect based on people's interpretations of what their approach behavior signals. Participants played an environmentalism game in which they sampled faces of CEOs, which were then paired with positive images of environmental protection or negative images of environmental harm that were caused by the CEO's company policies. Participants were randomly assigned goals that would encourage them to sample positively (find instances of protection to encourage), negatively (find instances of harm to discourage), or in a balanced way (find instances of both). We found that the effect of approach on subsequent evaluations of a stimulus depended on sampling goal. Sampling a stimulus more (vs. less) frequently predicted a more positive evaluative shift regardless of paired valence among participants with a positive sampling goal, but a negative evaluative shift among participants with a negative sampling goal. Among participants with a balanced goal, the approaching a stimulus more increased the effect of paired valence. Thus, the current findings highlight the malleability of approach-avoidance effects, demonstrating instances in which choosing to frequently approach a stimulus can lead to liking it less.

Keywords: sampling, evaluative conditioning

Presentation type: Oral presentation / Talk

Session: How agents' cognitive processes shape self-determined information search and the resulting judgements and decisions

Sensitive to Melodies – How Musicality benefits the processing of vocal emotions

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Musicians have an advantage in vocal emotion perception compared to non-musicians. However, the mechanisms underlying this advantage are poorly understood. Although initial evidence suggests that acoustic sensitivity towards emotional voice cues plays an important role, it is unclear how musicians use these cues to perceive vocal emotions and how this might differ from non-musicians. To address this, we presented vocal stimuli manipulated via parameter-specific voice morphing (Tandem-STRAIGHT) that conveyed happiness, fear, pleasure, or sadness, either in all acoustic cues, or selectively in either pitch contour (i.e., voice melody) or timbre (i.e., voice quality) only. We then compared vocal emotion perception performance between two groups of professional/semi-professional musicians (N = 39) and non-musicians (N = 38). In line with previous findings, musicians outperformed non-musicians. This advantage was seen in the full and pitch-modulated conditions, but was absent in the timbre-modulated condition. Thus, musicians excel at perceiving the melody, but not the timbre of vocal emotions. Further correlational analysis revealed a link between acoustic sensitivity towards melodies and vocal emotional skills that even persists in the absence of any musical training, suggesting a predisposition in individuals to exploit melodic patterns in both music and voices. Together, these findings suggest that musicians are particularly tuned to the melody of vocal emotions, and that this may in part be due to a natural sensitivity towards melodic patterns.

Keywords: vocal emotion perception, timbre, pitch contour, voice melody, parameter-specific voice morphing, musicality, musicians

Presentation type: Oral presentation / Talk

Session: Aesthetics and perception

Localizing moving objects: The importance of perceived speed

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The localization of dynamic stimuli in the human visual system is often biased, resulting in a systematic distortion of the localization process. For example, when participants are asked about the onset or offset location of a given target, systematic biases such as the Fröhlich effect or the Representational Momentum effect have been observed. These effects have been shown to be particularly sensitive to changes in target speed, in the sense that, greater target speeds typically produce stronger localization errors. While being a critical influencing factor, the speed aspect has been mostly reduced to its physical features, that is, physical speed was experimentally manipulated. Yet, studies have shown that physically identical speeds can be perceived differently by manipulating the appearance of the target and background. The present study therefore aims to investigate the possible influence of perceived, rather than physical speed, on the localization of onset and offset. To implement this, parameters regarding the appearance of target and background were manipulated to create different perceived speeds for three targets, while simultaneously keeping the physical target speeds

constant. In a first step, our results clearly indicated that our manipulation was successful, that is, the three targets resulted in strong differences regarding perceived speeds. In a second step, our results indicated that perceived onset as well as offset location biases systematically increased with increasing perceived speed. This indicates the importance of perceived speeds in motion localization, and theoretical implications are discussed.

Keywords: Fröhlich Effect, Representational Momentum, perceived position, localisation, motion perception, speed perception, vision

Presentation type: Poster Presentation

Session: Scene perception

Optimal Allocation of Time in Risky Choices under Opportunity Costs

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In economic decision-making there is a fundamental trade-off between deliberation time to make a good decision and opportunity costs of other rewarding activities. Recent theories analyzed how the optimal strategy of evidence accumulation for this problem depends on the environment. If the utility difference between two options is known a priori, deciders should accumulate evidence according to a drift-diffusion model with constant decision boundaries, if this difference is unknown beforehand collapsing boundaries should be used. Further, the exact position of the boundaries depends on the opportunity costs. However, little is known about whether people use these strategies adaptively. Here, we used a new data visualization to find signature patterns of behavior for optimal strategies. We then conducted two experiments, where participants rated and chose between risky lotteries, while we varied prior information and opportunity costs. We found that while participants were sensitive to opportunity costs, they failed to stop deliberation about their choices fast enough when no information about the utility difference of two lotteries was available. We discuss how this suboptimality can make participants spend too much time on problems where there is little to gain in real-world scenarios. Hence, whereas prior research focused on biases from utility maximization, we show that when taking opportunity costs into account, deciders can be too eager to maximize utility in an isolated choice problem.

Keywords: risk taking, risky choice, collapsing boundaries, drift diffusion model, optimal decision making

Presentation type: Oral presentation / Talk

Session: Technology acceptance and risk assessment

Age differences in perceived locus of control over pain

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Aging is characterized by a decline in the top-down modulation of pain. These top-down modulatory processes play a major role in daily life situations where painful events occur unexpectedly and beyond a person's control. To date, however, it is unclear how a perceived lack of control influences the perception of pain and the underlying modulatory brain regions in aging. In the present study, we manipulated the perceived locus of control over a low and a high pain stimulus in a group of younger (n=16, age=23.1) and older (n=20, age=63.6) participants. Each participant's personalized level of low and high pain experience was determined using electric shocks. Next, participants were informed that they would receive either their personalized low or high painful stimulus (high control), or a low or high level of stimulation generated by the computer (low control). Unknown to them, the computer-generated intensities were the same as the personalized low and high levels. We recorded participants' experienced level of control over the self versus the computer-generated shocks, and after each shock participants rated their level of pain. Electroencephalography (EEG) was also recorded. Preliminary analyses indicate that, in both age groups, participants reported higher levels of control over their personalized compared to the computer-generated electric shocks. Moreover, in both age groups a similar effect was found where subjective pain ratings were lower following computer-generated pain. Further analysis will focus on the electrophysiological correlates of the anticipatory and shock phase, comparing them between self and computer-controlled trials for both age groups.

Keywords: pain control, aging, expectation, pain experience, top-down modulation, EEG

Presentation type: Oral presentation / Talk

Session: Pain and Aging

Openness to cosmetic surgery among Hungarian university women: Scrambled Sentence Task as priming

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As physical attractiveness plays an important role in human mating psychology, women try to look as attractive as possible. Cosmetic surgery can be a tool to enhance attractiveness. As women are under considerable socio-cultural pressure to achieve the ideal of slimness, cosmetic surgery is becoming increasingly popular. These social expectations are easily internalised by women, who begin to see their own bodies as aesthetic objects, which also increases the popularity of cosmetic surgeries. The present study investigates the openness to cosmetic surgery among Hungarian

university women in a priming situation. 102 women (Mage=20.7, SDage=2.13) participated in the personal data collection. They were randomly divided into 3 groups and solved a 15-sentence version of the Scrambled Sentence Task (e.g., 'A woman must be sexy'). The priming sentences were either body-objectifying or body-empowering or unrelated to physical appearance. The participants also filled a questionnaire package containing the Acceptance of Cosmetic Surgery Scale (ACSS), Body Appreciation Scale (BAS), Objectified Body Consciousness Scale (OBCS), and Rosenberg Self-Esteem Scale (RSE). Our results showed that those participants who worked with the body-objectifying sentences were more open to cosmetic surgery, had more negative body image and self-esteem than the two other groups. However, the Scrambled Sentence Task wasn't effective enough to increase self-objectification, as no significant difference was found for objectified body consciousness. This experiment reflects well the messages from the social space related to physical appearance, but to investigate the complex effect of media, we need to complement the priming situation with visual and sound effects.

Keywords: cosmetic surgery, objectified body consciousness, body image, self-esteem, priming

Presentation type: Oral presentation / Talk

Session: Public health and disorders

Social Media use and learning motivation – What role do materialistic values play?

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Social media such as YouTube, TikTok, and Instagram, in which materialistic values are ubiquitous, have become an essential part of the everyday lives of children and young adults in recent years. However, surprisingly few studies have examined the effects of social media on learning motivation and the potential role of the primarily used social media platform. One such study shows that problematic use is negatively related to intrinsic learning motivation (Reed & Reay, 2015). Furthermore, the expression of materialism has been shown to negatively impact intrinsic learning motivation (Ku et al., 2014). For this reason, one possible moderator for the relationship between problematic use and intrinsic learning motivation is materialism, defined as a value orientation emphasizing the importance of money and material possessions for happiness and success in life (Kasser, 2016). In the present study, we conducted an online experiment to activate materialistic values in participants to examine their effect on situational learning motivation. Participants (N = 149) were randomly assigned to one of three groups. In the first two groups, participants were either asked to rate the pleasantness of images of luxury goods or images of nature, both of which were framed as Instagram posts. A third group, which did not receive images for evaluation, was included as a control group. The findings provide evidence that activated materialistic values

moderate the relationship between problematic use and intrinsic learning motivation. Limitations, applied implications, and future directions are discussed.

Keywords: social media, materialism, learning motivation

Presentation type: Poster Presentation

Session: New media and machine interaction

Affective Stimuli Impact Preference and Search in Decisions from Experience

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Affect guides decision making in several ways. Previous research has examined how incidental affect (i.e., mood) and anticipatory affect of the possible outcomes of an option impact preference. By contrast, little is known about the effects of affective associations with the options acquired via evaluative conditioning. Evaluative conditioning influences people's attitudes; but does it also influence actual decision behavior? Here we test the effects of evaluative conditioning on choice and search in experience-based risky choice. Participants first learned to associate initially affectively neutral visual stimuli with positively or negatively valenced pictures. In a subsequent risky choice task, the stimuli were used as labels for monetary lotteries and participants chose between pairs of lotteries. In Experiments 1 and 2 participants acquired information about the lotteries' payoff distributions by drawing samples from them before indicating their choice based on the samples they recalled. The results showed two distinct effects of evaluative conditioning on behavior. First, participants drew larger samples from a lottery the more positively valenced its label was relative to the other lottery's label. Second, computational modeling of participants' choices indicated that positively valenced labels biased preference for a lottery irrespective of the information that the participants sampled about the lotteries. This biasing effect of affect on choice disappeared in decisions from description (Experiment 3), where information about the payoff distribution is openly displayed and does not have to be retrieved from memory. Evaluative conditioning may thus sway preference only when other relevant information is costly.

Keywords: decision making; risky choice; emotion; learning;

Presentation type: Oral presentation / Talk

Session: Attitude formation and decision making

Investigating the saliency of threatening stimuli: General Features vs. Valence

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Threatening stimuli elicit automatic attentional orientation that is hard to inhibit. This is either due to the strong affective information (valence) of these stimuli, or their general physical features (e.g., shape). We tested whether affective or physical features play a more important role in the modulation of attentional resources when it comes to threatening stimuli. We used a visually challenging semantic vigilance task where participants saw a masked word and had to respond to living meaning and ignore non-living ones. Participants were divided into two groups: group 1 saw threatening affective distractors (snakes) during the task, while group 2 was presented with nonthreatening but visually similar distractors (caterpillars). Both groups completed a control condition as well, with neutral distractor (fish). During the experiment, we manipulated the distance of these distractors from the task (close, middle, far). Our results indicate that when distractors are presented close to the task, they interfere with performance. Distractors in other positions had no effect on performance. As for the question of affective valence vs. physical feature, our study could not provide a clear answer. Participants performed well when they were shown threatening and shape-similar distractors, possibly because of the arousal stimulation effect. However, the groups had significantly different performance in the neutral trials. Threatening information in both groups might have had a priming effect during the task. This resulted in better performance when threatening affective stimuli were presented, rather than shape-similar objects, as the latter might have caused uncertainty and ambiguity in the participants.

Keywords: inhibition, threat, selective attention, attentional control

Presentation type: Poster Presentation

Session: Emotion cognition

Back to the basics for measuring preference of contemporary art

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Since 1876 many changes have taken place in the field of experimental psychology. These paradigmatic shifts shaped the science of empirical aesthetics as well. For today, many factors and features have been identified in the process of aesthetic appreciation. The more and more sophisticated theoretical considerations and the improving technics of the research methods have been clearly helped the development of the field. Meanwhile, the main goal of the experimental activities remained faithful to the original

idea, namely understanding what happens when someone meets an artwork. Parallel to the scientific developments there is one another challenge contemporary empirical aesthetics needs to face. The concept of art has changed so much during the last century. In 1876 it was adequate to imply oil painting into the research as stimulus, but today a wide variety of firms of art has been appeared such as concept, performative, participative, interactive and technically modified etc. art. We think that considering contemporary art, it is worth a look on the changing scientific methods (especially the measuring methods such as the preference choice tests, Likert scales etc.) in order to see the scope of them currently.

Keywords: measuring preference, contemporary art, art appreciation

Presentation type: Oral presentation / Talk

Session: Experimental Aesthetics Following Fechner's Conceptions I

Helping Robots in the Presence of Bystanders

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Robots are playing an increasingly important role in everyday life. Nevertheless, robots' capabilities are still limited so far, so they regularly depend on human assistance, such as when they get stuck. In the present research, we looked at the conditions under which people are willing to help robots. We studied the bystander effect – the reduced willingness of individuals to help other humans in the presence of bystanders – in a human-robot interaction scenario. We performed an online study that provided participants with a cover story that required them to select one of two options for several situations. Critically, this cover story also included two situations that presented a robot needing help (open a door for the robot; charge the robot), once in the presence of bystanders and once with the robot depicted alone. Participants could choose between helping the robot or not. We observed that the presence of bystanders significantly reduced participants' intention to help the robot. We also investigated the influence of participants' gender on their intention to help. We observed no significant influence of participants' gender overall, but exploratory analyses indicated that participants' gender might affect the bystander effect for specific situations. To summarize, we observed a bystander effect in human-robot interaction, suggesting that helping behavior toward robots and humans may depend on similar influence factors.

Keywords: bystander effect, human-robot interaction, helping behavior

Presentation type: Poster Presentation

Session: New media and machine interaction

Do affective consequences modulate stimulus response binding and retrieval? Evidence from a free choice task

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In this experiment, we aim to study the relationship between stimulus-response binding and retrieval (SRBR) – a fundamental mechanism driving behaviour automatization – and instrumental learning. We use a free-choice task to demonstrate probabilistic rule learning of color-response relations through positive and negative feedback that is related to monetary incentives (instrumental learning). In the very same experiment, we also investigate the modulatory role of affective consequences on SRBR effects. These latter effects are assessed with a sequential prime-probe design, using an orthogonal variation of Response relation (colour repetition vs change) by Distractor relation (word repetition vs change). To investigate the relation between SRBR and rule learning, we test whether there is a standard SRBR effect, whether it is modulated by the feedback received on the previous trial, and whether the strength of these effects correspond to the general learning effect. Results are discussed with regard to their implications for theories of learning and habit formation.

Keywords: stimulus-response binding and retrieval, affective consequences, instrumental learning, feedback, cognition, action planning, episodic memory

Presentation type: Oral presentation / Talk

Session: Recent advances in binding and retrieval in action control I: Learning, task switching, music, and neural correlates

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Forward testing effect under acute psychosocial retrieval stress

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The forward testing effect (FTE) refers to the finding that testing of previously studied information improves memory for subsequently studied newer information. Recent research showed that the FTE is immune to acute psychosocial encoding/retrieval stress, i.e., stress that is induced before initial encoding. The present study investigated whether the FTE is also robust to acute psychosocial retrieval stress, i.e., stress that is induced after encoding but before retrieval of the critical item list. Participants (N=128) studied three lists of 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). After study of the critical list 3, psychosocial stress was induced in half of the participants (stress group), whereas no stress was induced in the other half (control group). The Trier-Social-Stress-Test-for-Groups (TSST-G) was

used for stress induction. Salivary cortisol, alpha amylase, and subjective stress were repeatedly measured. The results of the criterion test showed a generally detrimental effect of psychosocial retrieval stress on list 3 recall. Importantly, the FTE was unaffected by stress. The findings are discussed with respect to current theories of the FTE.

Keywords: episodic memory, practice tests, acute psychosocial stress

Presentation type: Oral presentation / Talk

Session: Benefits of Practice Tests on Learning

Role of Instruction in Emotional Encoding and Vulnerability

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Threat detection and fear memories are typical adaptive-survival behaviours depending upon proximity, intensity, and the likelihood of following an aversive outcome. However, there is a distinction between the two processes. Threat detection can be understood as the primal processes involved in the formation of experience; asserting that emotions are higher-order processes engrained in the cortical circuits forming consciousness. The human emotional experience of fear is the result of the complicated interaction of threat-detecting systems with memory processes- storage and retrieval and vigilance of the environment. In this paper, we examined the role of fear or threat-inducing and neutral stimuli using shallow and deep instructions on memory encoding. We investigated how people with high anxiety encode information in the environment differently from people with no anxiety. We study the effect of shallow and deep instructions on people with high anxiety. Images were sequentially presented at the encoding phase, followed by a break where the participants engage in playing games and then into the retrieval phase. We used a standardized questionnaire to assess trait anxiety. Our results show that people with high anxiety have better retrieval for negative stimuli. Though, we find that people tend to encode negative stimuli over positive and neutral stimuli. Moreover, we find that people with high anxiety encode negative information significantly greater during shallow instruction than when provided with deep instruction. Findings suggest individuals are more prone to negative over positive information encoding supporting survival instincts, individuals with high anxiety encode information relying on negative retrieval bias.

Keywords: threat detection, high anxiety trait, encoding, negative stimuli

Presentation type: Poster Presentation

Session: Emotion cognition

Pre-attentive visual processing of the human body

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The visual detection of other people is an important first step in social cognition. Here we provide evidence for selective sensitivity of the human visual system to upright depictions of human bodies. In the first series of studies, we used continuous flash suppression to render stimuli invisible and measured the time upright and inverted stimuli needed to overcome such interocular suppression. Upright bodies broke suppression more quickly than inverted bodies, while suppression durations for inanimate objects were not affected by inversion. Next, we used an inattentional blindness paradigm (1 trial per participant) to test whether a briefly presented upright body silhouette is more likely to be noticed than an inverted silhouette, even when nothing is expected. Results (N=2000) showed higher detection rates for upright bodies than inverted bodies. No such inversion effect was observed for a control object (plants). Finally, using fMRI we tested whether bodies (and control objects) activate high-level representations in visual cortex when they are task-irrelevant and spatially unattended. Results showed that activity patterns in high-level visual cortex carried information about the presence of bodies but not about other object categories under these conditions. Furthermore, this body-selective response was modulated by feature-based attention in a spatially global manner. Altogether, these results indicate that the form of the human body is processed pre-attentively, resulting in privileged access to awareness, enhanced detection, and selective processing in visual cortex even when unattended. Such a pre-attentive detection mechanism ensures that we rarely fail to notice the presence of other people.

Keywords: body perception, fMRI, attention, awareness

Presentation type: Oral presentation / Talk

Session: Person perception

Task order modulates the across-task integration of element-level features in dual-tasking

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Several findings suggest that in dual-tasking the two tasks are not represented as isolated task-sets, but rather being integrated into a single task-set. This view of integrated task representations is supported by recent studies, showing on the task element-level, that the stimuli and responses of the two tasks are associated across tasks and are stored in a conjoint memory episode (Pelzer et al. 2021, 2022). In addition several studies show on a more abstract task-level, that changing the task order leads

to substantial costs (Kübler et al., 2022). In the current study we aimed at testing how aspects of a more abstract task-level, such as task order, determine across-task integration on the task element-level. To assess across-task integration, we investigated partial repetition costs by testing the effect of the stimulus combination in the previous trial n-1 on the processing in the current trial n. We used a dual-task paradigm consisting of a visual-manual task and an auditory-manual tone task. Participants had to indicate the position of a cross appearing at one of four locations and to discriminate a high and low tone by pressing the respective keys. All participants (N=30) completed two blocks without task order changes and thereafter six blocks in which task order randomly changed in 50% of the trials. The results revealed partial repetition costs for task order repetitions, but not for task order changes. Overall the results suggest that aspects of the abstract task-level structure and the element-level structure are stored as one conjoint memory episode.

Keywords: dual-tasking, task integration

Presentation type: Poster Presentation

Session: Cognitive flexibility

Assessing visual attention when distrusting AI decisions.

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Situated within a collaborative research centre (CRC / TRR 318) concerned with Explainable AI, we study healthy distrust in machine learning results and explanations. Opposed to the typical concern for trust in AI, we focus on distrust in AI. Given that AI models can err, we propose that the possibility to critically review, to distrust, an AI decision and its explanation also needs to be considered. Currently, we define healthy distrust as a temporary state of increased attention and vigilance towards a possible inadequate decision. We plan to study visual attention in the context of image classification. Participants will have to indicate their (dis)trust towards the classification explicitly. Furthermore, by following the Theory of Visual Attention (TVA; Bundesen, 1990) and by incorporating temporal-order judgment tasks in the presentation of the image classifications, attentional parameters will be assessed. To know and manipulate whether and to which degree errors are present in the classifications, the image (mis)classification will not be an output of an AI model but will be constructed. Estimates of the visual attention when correct or wrong classifications are presented will be assessed and compared to the participants' explicit judgments of the classifications.

Keywords: visual attention, distrust, TVA, trust in AI, healthy distrust

Presentation type: No-Data Poster

Session:

Adapting to the Unexpected: On anticipatory saccades following unexpected action outcomes

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Action outcomes that contingently follow our actions become bi-directionally associated with them. Thus, by anticipating desired outcomes, we are both able to select and plan corresponding actions and to proactively shift our attention towards the location of our action's future outcome (anticipatory saccades). Such anticipatory saccades reflect a proactive effect monitoring process that prepares a later comparison of expected and actual outcome. Here, I addressed the question how we control and adjust such proactive shifts of attention (i.e., proactive effect monitoring) following unexpected outcomes. Participants' left and right key presses caused videos of falling items to appear at predictable locations spatially compatible or incompatible with the action. In 80% of the trials, the videos appeared at the expected location and showed regular items. In 10% of the trials each, however, the videos either appeared at the unexpected location or they contained unexpected, physically-impossible content (e.g., a spoon melting upon impact). Manual response measures in trials following unexpected outcomes were only affected by preceding unexpected outcome locations. Anticipatory saccades, however, showed dissociable effects of unexpected location as compared to unexpected content. Following a trial with an unexpected outcome location, participants were less likely to anticipatorily saccade towards the frequent outcome location as compared to following an expected outcome. Conversely, they were more likely to anticipatorily saccade towards the future outcome after encountering unexpected outcome content rather than an expected outcome. This suggests that cognitive control processes selectively adapt anticipatory saccades (i.e., proactive effect monitoring) depending on the nature of unexpected events.

Keywords: cognitive control, proactive monitoring, action-effect learning, anticipatory saccades, eye tracking

Presentation type: Oral presentation / Talk

Session: Anticipation and prediction

„Does acute Stress influence the successful Distraction from Pain in young and older Adults?"

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Previous research has shown that cognitive modulation of pain through psychological strategies can contribute to pain relief and that distraction from pain through cognitive engagement represents an efficient method of these strategies. However, little is known about the impacts of stress and age on pain modulation, although previous findings suggest a negative effect of stress and that the efficacy may be impaired due to age-related cognitive decline. The present study therefore investigated the impact of acute stress on the efficacy of pain modulation through distraction in aging. Before and after an acute stress induction using the Trier Social Stress Test (TSST) or a control condition, healthy younger (18-30 years) and older (60+ years) adults performed a n-back working memory task with low (0-back) and high (2-back) working memory load serving as the distraction paradigm, during which participants received individual adjusted non-painful and moderately painful electrical stimuli transmitted transdermal to the left inner forearm and rated them regarding intensity and unpleasantness on a visual analogue scale. Stress response was measured using heart rate and pulse and mood questionnaires about the stress experience. Preliminary results suggest more effective pain distraction under low working memory load for older adults, while in younger adults, pain reduction was higher under high load condition. So far, acute stress did not affect pain distraction in both age groups. The final results may contribute to a deeper understanding of pain modulation in aging and the impact of stress for a helpful optimization of pain therapy in older age.

Keywords: Pain, Stress, TSST, Pain Distraction, Aging

Presentation type: Oral presentation / Talk

Session: Pain and Aging

Reconstructing the naïve theory of the self

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This study consists of a series of experiments in which we try to identify core characteristics that determine whether we attribute a self to other agents. We will investigate causality, speed, equifinality, behavioural efficiency, learning and context sensitivity. We manipulate the behaviour of small robots to either suggest the presence (C+) or absence (C-) of these characteristics. In our first experiment we tried manipulating causality showing a robot colliding with and moving a white box for C+ and stopping at the point of collision without moving the box for C-. We then asked participants to rate both robots with our own manipulation check scale, the Mind Attribution (MAS), Godspeed (GS) and Robotic Social Attribution Scales (RoSAS). A 2x3 ANOVA with *characteristic* (levels are the six characteristics of interest) and *robot* (C+ vs. C-) as within subject factors and following pairwise t-test revealed significantly higher ratings for causality in C+, however we also found significantly higher ratings for context sensitivity in C-. A 2x3 ANOVA with *subscales* (levels are the subscales of MAS, GS and RoSAS) and *robot* (C+ vs. C-) as within subject factors and following pairwise t-tests showed significantly higher ratings for agency, experience, likeability, perceived

intelligence and perceived safety ratings for the C- robot. The data from the first experiment do not suggest that causality has an effect on mind-attribution to other entities, but there is evidence for an effect of context sensitivity.

Keywords: self, mind-attribution, agency, causality, context-sensitivity, robots

Presentation type: Oral presentation / Talk

Session: Human machine interaction and social cognition

Empirically testing the selective influence assumption of the Diffusion Model

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Cognitive modeling has been proven useful to explain basic cognitive processes such as decision-making. The drift diffusion model (Ratcliff, 1978) constitutes one such cognitive model that has been shown to add value over traditional behavioral analyses in binary reaction time tasks. Specifically, by postulating that the decision process is characterized by a noisy information accumulation process the diffusion model explains behavior in binary reaction time tasks using four main parameters. These four main parameters each refer to one information-processing aspect of a decision which makes the model valuable for researchers and practitioners alike. However, despite its usefulness in disentangling different cognitive processes underlying decision making in binary reaction time tasks, doubts have recently emerged questioning one assumption of this model. That is, recent studies have shown that the selective influence assumption (SIA), i.e., the assumption that a specific manipulation maps onto only one model parameter, is not always met. We have investigated the SIA on the non-decision time - a parameter assumed to reflect encoding as well as motoric processes - by manipulating the ease of stimulus encoding. Preliminary results speak in favor of the convergent validity of the non-decision time parameter. However, the manipulation did not only affect the non-decision time but also other parameters of the diffusion model (starting point and drift rate), possibly challenging the discriminant validity of these parameters and the SIA.

Keywords: Cognitive modeling, Diffusion Model, non-decision time, validity, stimulus encoding

Presentation type: Oral presentation / Talk

Session: Cognitive modelling

Adult age differences in the integration of value for self and other

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Meta-analytical evidence suggest that older adults exhibit more prosocial behavior than younger adults. However, the underlying factors explaining such behavioral differences in adult age are not clear. Theories of prosocial behavior propose that prosocial choices might require cognitive control. We aimed to characterize prosocial behavior and the influence of cognitive functioning and control in younger and older individuals. Sixty-three younger (18-30 y., YA) and 48 older adults (65-78 y., OA) participated in a modified dictator game, in which they had to decide whether or not to accept offers that split money between themselves and a partner. Further, a battery of cognitive functioning and control tasks was performed. Preliminary results indicate differences in integrating monetary values for oneself and the other as a function of age group: YAs' choices to accept an offer were modulated by both, the amount of money they as well as the other would receive for a specific offer. In contrast, OA exclusively considered their own potential gains when deciding to accept. Further, YAs' reaction times (RTs) were modulated by an interaction of value for self and other, whereas OAs' RTs were only modulated by their own potential gain. Preliminary results do not indicate moderation effects of cognitive functioning or control in choice behavior. With respect to RTs, the interaction of value for self and other was moderated by crystallized abilities in YA and fluid abilities in OA. We discuss these findings in light of the prosocial growth hypothesis and lifespan approaches.

Keywords: prosocial behavior, prosociality, adult lifespan, adult development, executive functioning, cognitive control, decision making

Presentation type: Poster Presentation

Session: Moral decisions and social interaction

"Seeing where" happens earlier and faster than "seeing what“

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Recent evidence suggests that visual processing for perception within the ventral visual "what" stream not only computes feature (e.g., color) and category information (e.g., object identity) but also spatial information (e.g., object position). Thus, an object's category and its location at least partly seem to be processed by the same mechanisms. Therefore, we ask whether the location of an object and its object category are processed equally or whether they differ in how fast they are processed and in how early their processing starts. To this end, participants performed a letter report task in which they briefly viewed a letter that was terminated by a mask display. Afterwards, they reported the identity of the letter (alphanumeric category) and its spatial location. Assessing report performance as a function of presentation duration of the letter and using the Theory of Visual Attention (TVA, Bundesen, 1990, Dyrholm et al., 2011), we obtained measures for the onset (temporal threshold of conscious perception) and the speed of visual processing for both features, letter location and letter identity. We found for location reports that the visual processing speed was higher than for reports of letter identity and, in contrast to a key assumption of TVA, that the temporal threshold of conscious perception was lower. Thus, seeing where an object was happened earlier and faster than seeing what the object was.

Keywords: visual attention, object recognition, TVA

Presentation type: Oral presentation / Talk

Session: Advances in TVA-based visual attention research I: Basic and Applied

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Use Intention of AI Applications: the Effect of Knowledge and Risk and Opportunity Assessment

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Artificial Intelligence based applications are an ever-expanding field, with an increasing number of sectors deploying this technology. To better understand laypeople's intention to use AI applications for a broad number of domains (health, eldercare, driving, data processing, and art), we conducted a study (N= 450) assessing well-established variables in AI research (trust, familiarity). At the same time, we assessed three new concepts: knowledge about AI, risk and opportunity assessment for each domain, and a newly developed, socio-emotional perception scale. Results show that the newly investigated variables best predict overall intention to use, above and beyond trust and familiarity. Higher AI-related knowledge, more positive socio-emotional perception, and lower risk perception significantly predict general AI use intention. Furthermore, when investigating domain-specific AI use intention a similar trend emerges: knowledge, risk and opportunity perception, and socio-emotional perception best predict use intention in four (health, eldercare, driving, and data processing) out of the five investigated domains. Additionally, our results indicate that both AI use intention and risk and opportunity perception are distinctly domain specific. Higher opportunity assessment for the driving domain solely predicts the use intention for driving and not any of the other investigated domains. Our findings thus highlight the relevance of knowledge, risk and

opportunity assessment, and socio-emotional perception, in understanding laypeople's intention to use AI-based applications. The ramifications of such results are ample and open a new roster of research questions in understanding people's AI use behavior intentions, their perception of AI, and possibly informing future AI use and acceptance trends.

Keywords: artificial intelligence, AI use intention, knowledge, risk and opportunity assessment, socio-emotional perception

Presentation type: Oral presentation / Talk

Session: Technology acceptance and risk assessment

Diagnosticity in Personnel Selection: Effects of the Big Two on Sampling and Judgement Behaviour

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In a series of person impression formation experiments, we confirmed the systematic impact of diagnosticity on sampling and judgement behaviour. When forming impressions on target individuals and groups from trait words, the required number of words (sample size) and the strength of the resulting impression are both a function of input valence, extremity and stimulus density (i.e. the multi-dimensional distance between sampled traits). We transferred this diagnosticity perspective to a personnel selection paradigm, where participants were instructed to form an impression on a target applicant characterised by their behaviour in an assessment centre. We systematically presented target behaviours according to the big two (agency vs. communion) and valence (positive vs. negative behaviours). We found evidence for an interdependent impact of the big two and valence on sampling and judgement behaviour. Candidates characterized by negative communion and positive agency behaviours were judged more strongly and confidently and samples were stopped earlier compared to positive communion and negative agency behaviours. In addition, the target job profile was adjusted to either require an agentic or a communal profile. Fit of behaviours to profile predicted sampling and judgement behaviour as well. In different paradigms, we found evidence for diagnosticity effects, which systematically depend on the task (question asked/ hypothesis tested) and the information environment (density/frequency structure in a typical environment).

Keywords: diagnosticity, sampling, impression formation

Presentation type: Oral presentation / Talk

Session: How agents' cognitive processes shape self-determined information search and the resulting judgements and decisions

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Adaptive control when responding to colors and words of Stroop stimuli with temporally separated target and distractor components

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Task switching often features reversal of target and distractor stimulus dimensions, such as when switching from the Stroop task (i.e., target: color, distractor: word) to word identification (i.e., target: word, distractor: color). Enhanced task-switching costs after incongruent compared to congruent predecessor trials have been attributed to Dimension Negative Priming (DNP; i.e., inhibition of processing of the interfering stimulus dimension). In single task contexts, the Stroop effect tends to be lower after incongruent than after congruent trials. This Congruency Sequence Effect (CSE) has frequently been found in conflict tasks and is widely attributed to conflict adaptation (i.e., conflict-induced adjustment of attentional weights for target and distractor information). In priming procedures, involving successive presentation of distractors and targets, this adaptation is conceived of as Temporal Order Control (TOC; i.e., reduced processing of the stimulus occurring at the temporal position of the distractor after incongruent trials). We investigated TOC and DNP when participants responded to Stroop stimuli with temporally separated distractor and target components. On each trial, a colored string of Xs and a color word (in neutral white) were presented in varying orders. The stimulus presented first (second) acted as distractor (target). Task instructions did not suggest interpreting the situation as involving two different tasks. Applying a “confound-minimized design” yielded performance costs after incongruent trials, when target and distractor dimensions were switched, as well as a CSE, which was not modulated by repetition/switch of target and distractor dimensions from the preceding trial. These results suggest simultaneous occurrence of DNP and TOC.

Keywords: Stroop, adaptive control, task switching

Presentation type: Poster Presentation

Session: Cognitive flexibility

The neurophysiological basis of event file coding in response inhibition

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As theories describing event file dynamics (Theory of Event Coding (TEC; Hommel et al. 2001), Binding and Retrieval in Action Control (BRAC; Frings et al. 2020)) aim to

provide a comprehensive explanation of how the mind works, their principles should apply not only in the frequently studied situations of response selection, but also in other domains such as response inhibition. In this talk, the relevance of event file coding to response inhibition and its neural underpinnings will be illustrated using EEG data that have been examined using a wide range of analysis methods including network analysis and MVPA. Moreover, the influence of pre-trial dynamics as well as manipulations of the catecholaminergic system on event file coding in response inhibition was investigated. The results show that depending on the event file coding requirements different mechanisms are used to process stimulus features, and thus to inhibit responses successfully despite conflicting information, as reflected, for instance, in a seesaw-like relationship between the theta and alpha frequency bands. Thus, examining the dynamics of event files in response inhibition and their neural basis demonstrates the applicability of event file coding theories such as TEC and BRAC in different cognitive domains and offers a contribution to more sophisticated theory building integrating cognitive and neurophysiological elements.

Keywords: event file coding, response inhibition, EEG

Presentation type: Oral presentation / Talk

Session: Recent advances in binding and retrieval in action control I: Learning, task switching, music, and neural correlates

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A picture is worth a thousand words – Feedback on veracity using the truthiness effect

Claudine Pulm [1, 2], Jan Rummel [1]

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The truthiness effect (Newman et al., 2012) refers to the tendency to believe statements to be true when they are presented together with a photo that is non-diagnostic for veracity. In an online experiment (N = 96) with two measurement time points, this effect and its persistence over time were investigated and extended by adding feedback on the veracity. The participants rated the veracity of trivia statements, which were presented either together with a non-diagnostic photo or without a photo. This was followed by either feedback on the actual veracity with a photo, without a photo or no feedback. After about 48 hours, the subjective truth of the statements was assessed again. The truthiness effect could neither be replicated immediately after the presentation of the statements nor after about 48 hours. Overall, feedback on the veracity led to the subjects being able to discriminate correctly between true and false statements more often at the second time point. Feedback with photos was particularly effective. Unexpectedly, each type of feedback also led to a response bias towards true. Based on the present results, the usage of a photo when giving feedback can be recommended. However, the importance and practical relevance of the truthiness effect require further research.

Keywords: Truthiness Effect, Misinformation, Feedback, Memory

Presentation type: Poster Presentation

Session: New media and machine interaction

The temporal gradient of retroactive interference: Replicable and explainable?

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Retroactive interference in episodic memory has been shown to be time-dependent: The shorter the time interval between an original and an interpolated learning phase, the stronger the interference effect is predicted to be. Although this temporal gradient of retroactive interference (TGRI) has been replicated repeatedly, some null results cast doubt on its robustness. At the same time, the TGRI is viewed by many authors as a central piece of evidence for the claim that consolidation in episodic memory occurs whenever hippocampal resources are not required for the encoding of new information. In contrast, temporal distinctiveness theory attributes the TGRI to differences in the discriminability (i.e., retrievability) of items in memory. In two preregistered studies, we aimed to scrutinize both issues of replicability and theoretical explanations. In a first replication study, we closely adhered to the original procedure introduced by Ecker et al. (2015) but conducted the study in an online setting instead of a more controlled lab environment. A joint analysis of the original and our replication data indicates a successful replication of the original finding. In a second study, we applied a newly developed multinomial processing tree (MPT) model to disentangle storage and retrieval contributions to free recall performance within the same paradigm. The parameter estimates from the MPT analysis allow for an effective test of both the consolidation and the temporal distinctiveness hypothesis. Thereby, our results help clarifying the cognitive mechanisms underlying the TGRI.

Keywords: Retroactive interference, temporal gradient, episodic memory, consolidation, temporal distinctiveness, replication, multinomial processing tree (MPT) modeling

Presentation type: Oral presentation / Talk

Session: Learning and models

Process-Sensitivity of the Changing-State Effect

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The finding that irrelevant sound that changes from one token to the next disrupts working memory more strongly than steady-state sound is well-established as the

changing-state effect. The two dominant accounts differ in whether they expect the changing-state effect to be process-sensitive: According to the duplex-mechanism account, changing-state effects are restricted to tasks in which participants process order information. According to an attentional capture account, they should occur independent of the role of order information. Most studies manipulating the task observed a stronger changing-state effect in tasks that necessitate order information than in tasks that do not, in line with the duplex-mechanism account. However, contrary to this account, a changing-state effect can also be found in tasks without order information. Moreover, a single task (i.e. the missing-item task) is almost exclusively used as the task without order information and the focus is on tasks demands instead of on what participants actually do. In our experiment, we used four different tasks (two based on order information, two not), recorded participants' strategy choice and used Bayesian modeling to evaluate if the changing-state effect is actually equal to zero when no order information is processed. Surprisingly, a changing-state effect was observed in only one of the order-based tasks and only in this task was the changing-state effect larger when participants applied an order-based strategy. The findings thus only partially support the duplex-mechanism account. In an ongoing conceptual replication, we aim to increase the probability of observing a changing-state effect in the first place.

Keywords: working memory, null effect, irrelevant-sound effect, process-sensitivity, task-specifitiy

Presentation type: Oral presentation / Talk

Session: Working memory

Explaining Dual-Action Benefits: Inhibitory Control and Redundancy Gains as Complementary Mechanisms

Tim Raettig, Lynn Huestegge

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Executing two actions at the same time usually results in performance costs. However, recent studies have also reported dual-action benefits: under certain circumstances, doing two things at once can yield *improved* performance in terms of lower reaction times and lower error rates. Here, we present a novel theoretical framework that can account for such effects by assuming that 1) performing only one of two possible actions may necessitate the inhibition of the initially activated, but unwarranted second action, leading to single-action costs and 2) dual-action execution may benefit from statistical facilitation based on redundant, response-related features of the stimulus (i.e., *dual* actions may be triggered as soon as *either* enough information for the execution of response 1 *or* enough information for the execution of response 2 has been extracted from the stimulus). The resulting model of multiple action control allows for context-dependent inhibitory coding (i.e., actions are sometimes cognitively represented in terms of what *not* to do) and handles inhibition via explicit cognitive control codes; it is complementary to existing theories of countermanding - in particular, the Pause-Then-Cancel framework by Diesburg and Wessel (2021) - but includes further testable

specifications of processes (and their components) which were previously only treated implicitly.

Keywords: multiple action control, dual-action benefits, inhibition, redundancy gains, pause-then-cancel

Presentation type: Oral presentation / Talk

Session: Dual tasks and action control

The prevalence of number-space associations in preschool children

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The SNARC effect, i.e., the association of small/large numbers to the left/right side of space respectively, is widely studied in adults and generally observed at the group level in about 67% of the participants. However, Cipora et al.,(2019) showed that when using a bootstrapping approach to analyze the consistency of the SNARC effect at the individual level, its prevalence decreased to about 40%. To date studies on the SNARC effect in children are scarce and, so far, none explored it at the individual level. Therefore, our aim was (1) to test whether preschoolers show a SNARC effect at the group level and (2) to determine the prevalence of children with a consistent SNARC effect. Based on the methodology suggested by Cipora et al., (2019), we tested 136 preschool children (Mean Age: 6.3 years old) in the final year of kindergarten with a magnitude judgment task. Descriptively and at the group level, 67% of the children revealed a regular SNARC effect ($p<.001$). Nevertheless, bootstrapping analysis, with an 80% confidence interval, showed that the prevalence of children with a consistent regular SNARC decreased to 37% and that even 19% had an inverted consistent SNARC. The prevalence of regular SNARC is thus equivalent to the one observed in adults when tested with a parity judgment task. Our results suggest that access to a spatially oriented numerical representation emerges at an early developmental stage, with, however, only a minority consistently showing the SNARC effect.

Keywords: SNARC; Number-Space; Consistency; Children.

Presentation type: Oral presentation / Talk

Session: How spatial are numbers?

Selbstgesteuertes digitales Achtsamkeitstraining: Eine Studie zur Implementierung von Strategien in den Alltag

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Das Angebot an digitalen Achtsamkeitstrainings ist nahezu unüberschaubar. Dabei fehlt jedoch häufig die wissenschaftliche Grundlage oder der Grundgedanke von Achtsamkeit wird nur unzureichend adressiert. Des Weiteren sind Erkenntnisse zu längerfristigen Verhaltensänderungen sowie Übertragungseffekten im Bereich digitaler Achtsamkeitstrainings rar. Dem gegenüber stehen jedoch positive Aspekte wie zeitliche Flexibilität, räumliche Unabhängigkeit und Kosteneffizienz, die in unserem Alltag zunehmend an Relevanz gewinnen und einen deutlichen Vorteil gegenüber klassischen Programmen bieten. Während bestehende digitale Achtsamkeitstrainings zumeist auf die reine Ausübung einzelner angeleiteter Übungen fokussieren, wurde der Ansatz einer Vermittlung von Informationen und dahingehenden Kompetenzsteigerung durch ein selbstgesteuertes Training bislang vernachlässigt. Die geplante Studie setzt an dieser Stelle an, indem einzelne Elemente von Achtsamkeitspraktiken aufgegriffen werden, Hintergrundinformationen bereitgestellt werden sowie die Teilnehmenden angeleitet werden und Möglichkeiten zur Integration in den Alltag vermittelt werden. Dabei können die Teilnehmenden die Auswahl der Elemente sowie den Zeitpunkt des Ausübens frei wählen. Ziel ist es, die Teilnehmenden zu einem selbstgesteuerten Training zu motivieren und zu befähigen. Die Studie sieht eine Prä- und eine Post-Messung nach vier Wochen vor, in der die Variablen Wohlbefinden (Stress, Schlaf, Emotionsregulation und Einsamkeit) sowie digitaler Medienkonsum im Fokus des Interesses stehen. Untersuchungsgegenstand sind studierende Personen im Alter von 18-30 Jahre ohne aktuelle oder chronische Erkrankung. Die Studie wird als Online-Studie geplant, mit einer Rekrutierung bevorzugt am Campus der Universität Duisburg-Essen.

Keywords: Achtsamkeit, Digitales Training, Wohlbefinden, Medienkonsum, selbstgesteuert

Presentation type: No-Data Poster

Session:

Deciding while moving: Proximal response features of movement cause cognitive crosstalk

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Humans often find themselves in situations during which they must decide while moving (e.g., when playing soccer, driving a car). During such embodied choice situations, reward-based decisions are not only biased by the motor cost to act, but also dimensional features of concurrent movement. However, prior studies did not assess whether dimensional features of movement per se (proximal features) or effects caused by the movement (distal features) give rise to this cognitive crosstalk. To disentangle these, we manipulated the mapping between movement (proximal features) and visual

effects (distal features) of movement. Participants worked on a multilane tracking task (for details, see Raßbach et al., 2021) in which they controlled a cursor moving across one of three horizontal lanes. The cursor was constantly perturbed either upward or downward, requiring scrolling downward/upward with the mouse wheel to counteract the perturbation. The mapping of this tracking task was congruent (e.g., scrolling downward = moving cursor downward) or incongruent (e.g., scrolling downward = moving cursor upward). Participants also made reward-based decisions by performing mouse movements forward or backward to switch to the upper or lower lane, respectively, to collect point rewards on the specific lane. Results showed that decisions were biased by the perturbation, with the direction the effect being almost completely reversed between response mapping conditions (i.e., preference to switch to the upper lane when scrolling upward and vice versa). This suggests that dimensional features of movement are responsible for cognitive crosstalk, while distal features do not seem to play a pivotal role.

Keywords: Embodied choice, Cognitive-motor interference, Multitasking

Presentation type: Poster Presentation

Session: Motor and action control

Reassessing selected wisdom of crowds findings by process-consistent statistical modeling

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New information technologies and social networks make a wide variety of opinions and advice easily accessible across different contexts. Therefore, assessing how much people are affected by informational influences is gaining importance in the social sciences. Traditionally, ratio-of-differences-based indices specify how strongly people move their judgment in the direction of advice compared to judgments made before receiving external information. The advantages of deterministic weighting indices are their intuitive interpretability and ease of calculation. Intermixing endogenous and exogenous components, however, is costly because it can lead to measurement problems and limits research to an overly restrictive set of questions and hypotheses. As a solution, we propose process-consistent mixed-effects regression for advice taking and related paradigms such as anchoring. Mixed-effects regression coefficients of various exogenous sources of information also measure individual weighting but are based on a conceptually consistent representation of the endogenous judgment process. Additionally, this statistically more adequate multilevel modeling approach enables the estimation of individual weights for nonlinear utilization strategies, sequentially sampled information, and multidimensional belief updating. The practical relevance of the proposed modeling framework becomes manifest in multiple reanalyses of existing empirical findings such as the functional form of the relationship between advice weighting and distance, or the quantification of informational influences without independent initial judgments in sequential collaboration chains. By process-

consistent modeling of information sampling and utilization, mixed-effects regression weights (of advice) have the potential to improve research practices and can be applied to develop new substantive areas.

Keywords: weight of advice, advice taking, belief updating, information sampling, judge-advisor system, wisdom of crowds, multilevel modeling

Presentation type: Oral presentation / Talk

Session: Advice taking and beyond: Judgment formation via advice taking, sequential collaboration, and belief updating

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Conflict processing over the course of adulthood in a large-scale dataset

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In this study, we explored effects of aging on conflict processing in a large-scale dataset from the cognitive training platform *Lumosity*. The dataset containes data from 1200 users distributed equally over six age categories that are equally spaced over adulthood. We analyzed trial-by-trial data of a Stroop task inspired game, to investigate effects of age on conflict processing. Since all users had played the game at least 60 times, we could relate the age effects with practice. Analyses of mean response times and accuracies indicated a rather constant increase in response times and congruency effects with age. We further investigated the temporal dynamics of the conflict by means of inspecting delta plots and Lorenz-interference curves, to gain insights into age related changes on the processing level. Such changes could be seen and they were, again, rather constant over the course of adulthood. However, these changes were counteracted by high levels of practice.

Keywords: Cognitive conflict, aging, delta plots, large-scale data

Presentation type: Poster Presentation

Session: Cognitive control and conflict

Unifying an Evidence Accumulation Model and Heuristics from the Adaptive Toolbox

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Various competing theories can describe multi-attribute decision-making, for example, the Adaptive Toolbox and Evidence Accumulation Models (Krefeld-Schwalb et al.,

2017). This study takes up the idea of unifying strategies from the adaptive toolbox with the evidence accumulation approach (Lee & Cummins, 2004). Published data is reanalysed (Bobadilla-Suarez, 2017; Bergert & Nosofsky, 2007) by applying a linear decomposition of the drift parameter of the Drift-Diffusion Model (Ratcliff, 1978) in a weighted strategy-specific component (validity rank of the first discriminating attribute for Take-The-Best; difference of positive attribute values between options for Tallying). We replicated the use of a strategy by the likelihood values of models with different strategy injections. Further, the graphical goodness of fit was satisfactory because the fitted and observed behavioural data overlapped. Additionally, we showed that the model maps strategy-specific difficulties: For the Take-The-Best strategy, the model mimics slower and less consistent responses when the search depth for the first discriminating attribute shifts to the lower end of the attribute matrix. Identical results are found for Tallying by varying the difference of positive attribute values as strategy injection. An advantage of this method is that we can simulate reaction times depending on the environment and the strategy usage. So far, it was only possible to contrast reaction times between different strategy-specific difficulties (Jekel, Fiedler and Glöckner, 2011). We could mimic strategy-specific observed behaviour by a very rudimentary strategy-specific injection into the drift parameter. Further research will investigate investigate whether injections on, e.g. the boundary/non-decision time parameter will improve the model.

Keywords: Drift-Diffusion-Model, Take-The-Best, Tally, Heuristics, multi-attribute, decision making, modelling

Presentation type: Oral presentation / Talk

Session: Cognitive modelling

Prediction in evaluative conditioning: Does the presentation sequence moderate US revaluation?

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Our understanding of the ways likes and dislikes are represented in memory is limited. The present work examines the information encoded during evaluative conditioning (EC). EC concerns the acquisition of attitudes via stimulus pairings. While EC is commonly viewed to result in links between stimulus identities (stimulus-stimulus learning), we argue that learners might abstract away from specific stimuli and rather store their overall valence (“positive”, “negative”; stimulus-valence learning). In particular, this might be the case when the overall US valence rather than the specific US can be predicted with high accuracy during EC. Two experiments (N = 522) modified an EC procedure in a way that predictions can be made and tested throughout learning. Every conditioned stimulus (CS) was either followed by multiple USs of the same valence (forward procedure), or multiple USs of the same valence were followed by the same CS (backward procedure). In the backward procedure, each US predicts one specific CS. In the forward procedure, each CS predicts the overall US valence, but

cannot predict the specific US. A US revaluation procedure was implemented to test the format of acquired US representations. Results show that presentation sequence did not influence the degree of US revaluation. However, US revaluation was observable in the first experiment employing multiple repetitions, but not in the second one with single learning trials. We discuss implications of the findings and consider them in the light of reinforcement learning mechanisms.

Keywords: Attitudes, Evaluative Conditioning, Predictive Learning, US Revaluation, Presentation Sequence

Presentation type: Oral presentation / Talk

Session: Emotion and cognition

Validity and Reliability of a New Version of the Everyday Problems Test to Assess Everyday Cognition

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The assessment of everyday cognition is crucial in cognitive training research to determine whether a training intervention has real-world effects in improving everyday-life functioning. Yet, objective measures for everyday cognition are limited. The Everyday Problems Test (EPT; Willis & Marsiske, 1993) is a pen-and-paper test that assesses everyday cognition in adults along seven scales related to the Instrumental Activities of Daily Living (IADL; Lawton & Brody, 1969). However, not all EPT items are up-to-date and relevant nowadays and the original validation focused exclusively on older adults using a test-retest interval of one year. Cognitive training studies often test adults from young to old age and use shorter intervals to assess and compare performance before and after training. Therefore, we constructed a computer-based short form of the EPT and assessed its validity and test-retest reliability across the entire adult lifespan. We updated or created items spread evenly across the IADL scales with a range of varying difficulties. Consequently, we administered a 14-item online version of the EPT along with sociodemographic questions (e.g., on education) and questions regarding IADL performance to 180 adults situated in the UK, stratified into three age groups: young (18-39 years), middle-aged (40-59 years), and older adults (60-85 years). Two weeks later, participants were invited to re-conduct the EPT. We will discuss the validity of this 14-item EPT and its relation to age, education and IADL performance, as well as its test-retest reliability and applicability in cognitive training studies.

Keywords: Everyday Cognition, Everyday Problems Test, Cognitive Training, Validity, Test-Retest Reliability

Presentation type: Oral presentation / Talk

Session: Public health and disorders

Sticky tradition impedes creative thinking

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Creativity is a driving force for human development that has fascinated scholars for centuries. Very little is known about the cognitive underpinnings of thinking outside the box, however. We present an action-dynamics approach, in which we track the unfolding of hand movements while choosing between either a traditional or a creative use of a given object. Participants could freely decide between both options (Experiment 1, N = 51 adults) or were prompted to select a specific use (Experiment 2, N = 51 adults). Temporal as well as spatial measures of action unfolding revealed behavior to be strongly biased towards traditional options, even when choosing an available, more creative option eventually. Creative behavior thus comprises two obstacles, coming up with new ideas while simultaneously overcoming a lasting bias towards old ones.

Keywords: creativity, innovation, cognitive conflict, motion-tracking, response dynamics

Presentation type: Oral presentation / Talk

Session: Current directions in free-choice paradigms II: What we can learn from giving more control to the participant

Effects of environmental deformation on cognitive maps

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Finding locations in a familiar environment requires accurate representations of space (‘cognitive maps’). In many species, the neural basis of cognitive maps are a set of specialized neurons in the hippocampal formation. Previous research has found that stretching or squashing environmental dimensions alters the firing pattern of hippocampal place cells and entorhinal grid cells in freely moving rodents as well as human spatial memory. This Indicates that boundaries defining the geometry of space play an important role in determining the nature of cognitive maps. Here, we examined how behavioural changes to environmental deformations relate to those on a neural level as measured with functional magnetic resonance imaging (fMRI) in humans, and how these effects can be explained by models of cellular firing. In this two-day study,

we first trained participants to learn the location of objects inside a virtual arena. During subsequent scanning, we asked them to re-visit each location inside the arena as well as actively imagine them outside the arena. Critically, the arena deformed from square to rectangular shape across days. So far, we found shifts in spatial memory related to the change in geometry that is best explained by a model of neurons sensitive to boundaries ('boundary vector cells', BVC). Furthermore, our fMRI data suggest that the hippocampus may use a distance code to represent the relationship between locations that scales with the geometry of the environment. Our study extends our understanding of how the cognitive map anchors its spatial representation to the external world.

Keywords: spatial memory, cognitive map, hippocampal formation, fMRI, virtual reality, boundaries, environmental deformations

Presentation type: Poster Presentation

Session: Scene perception

Prepared to stop: How sense of agency modulates inhibitory control

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Sense of agency (SoA) is the subjective feeling of being in control of one's actions and their effects. Many studies have elucidated the cognitive and sensorimotor processes that drive this experience. However, less is known about how SoA influences flexible cognitive and motor control. Here, we investigated the effect of SoA on subsequent response inhibition in a modified Go/No-Go task across two EEG experiments. We manipulated SoA by varying the presence, predictability, and emotional valence of a visual outcome for a given motor action. In both experiments and independent of the emotional valence of the expected action outcome, when participants' action unexpectedly did not produce any visible effect, they exhibited slower responses and lower hit rates in a subsequent Go trial but higher rates of successful inhibition in a No-Go trial. Moreover, enhanced inhibitory tendencies were accompanied by reduced N2 and P3 amplitudes, reduced midfrontal theta power, as well as reduced theta synchronization between midfrontal and other brain areas, indicating that less top-down control is required for successful response inhibition under a low SoA. Our results suggest that feeling less in control makes it easier to implement inhibitory control. This finding supports the "motivation from control" theory and sheds new light on the role of SoA in goal-directed behavior.

Keywords: Cognitive Control, EEG, Prediction Error, Response Inhibition, Sense of Agency

Presentation type: Poster Presentation

Session: Cognitive control and conflict

Feeling in Charge: Arousal and Individual Differences Impact the Sense of Agency

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The sense of agency varies as a function of arousal and valence in negative affect but is the same true for positive affect? Moreover, will inter-individual characteristics predict those effects? Temporal binding, an implicit measure of the sense of agency, was determined in 59 participants before and after watching a positive film clip with either high or low arousal compared to a neutral clip. Analyses included participants' subjective affective ratings, physiological arousal (pupillometry, skin conductance, heart rate), and individual differences (arousal reactivity via psychopathy, eyeblink rates). Linear mixed models showed low arousal reactivity lessened the effect of high arousal on binding towards actions and facilitated an effect of low arousal on binding towards actions. Low arousal reactivity reversed the effects of high arousal on binding towards outcomes. These results provide evidence that individual differences influence the extent to which the sense of agency is affected by positive affect.

Keywords: Sense of Agency, Temporal Binding, Arousal Reactivity, Striatal Dopamine Levels, Sexual Arousal

Presentation type: Poster Presentation

Session: Emotion cognition

The Cognitive Boost at the Peak of Circadian Arousal is Not as General as Previously Thought!

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Cognitive performance is assumed to be enhanced at the peak of circadian arousal compared to at off peak. This so-called synchrony effect is generally accepted as common knowledge. However, empirical evidence for this effect is mixed. This may be explained by two methodological challenges. First, most previous studies are underpowered. Second, these studies include one task, but the tasks differ across the studies. In the present study, we addressed these methodological challenges by asking 191 participants with morning or evening types to perform eight tasks at on- and off-peak times. We focused on two universal constructs: the temporary maintenance of information (i.e., the ability to maintain information for a short duration) and attentional control (i.e., the ability to avoid being distracted irrelevant information). We estimated

both constructs at the latent-variable level (i.e., as the common variance across the tasks without the impact of task-specific requirements). Contrary to the expectations, the results showed no synchrony effect for the maintenance of information. For attentional control, we observed a latent change between both on- and off-peak times. However, this change was at best small. Moreover, it was not robust across the different data transformations, participants' selections, trimming procedures, and analyses. Together, the present results indicate that the synchrony effect is not as general and robust as the last 30 years of research seems to suggest.

Keywords: cognitive control, attentional control, executive functions, working memory, synchrony effect, latent change, individual differences

Presentation type: Oral presentation / Talk

Session: Working memory

Are spatial-numerical associations of response codes reciprocal or not?

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The "spatial-numerical association of response codes" (SNARC) effect denotes superior performance of left responses to smaller numbers and right responses to larger numbers, as compared to the opposite mapping. This finding provides evidence for associations, or even overlap, between the mental representations of number and space. While some existing accounts predict unidirectional associations between numerical and spatial stimulus and response codes, other accounts predict bidirectional associations between number and space. To investigate the reciprocity of the SNARC effect, we compared the compatibility effect in two manual choice-response tasks. In the number-location task, participants responded to one or two dots with a left or right key press. In the location-number task, participants responded to a left- or right-side stimulus with one or two keypresses. Each task contained one compatible (one-left, two-right; left-one, right-two) and one incompatible (one-right, two-left; left-two, right-one) mapping condition. A strong compatibility effect occurred in the number-location task, reflecting the typical SNARC effect. However, no compatibility effect occurred in the location-number task. The results thus indicate that numerical stimuli can facilitate the selection and execution of spatial responses, whereas spatial stimuli cannot facilitate the selection and execution of numerical responses. The finding that spatial-numerical associations are unidirectional appears consistent with some accounts of the SNARC effect such as the mental-number line hypothesis, but inconsistent with other accounts such as the polarity-correspondence principle.

Keywords: spatial-numerical associations; SNARC; reciprocity; symmetry; mental-number line; polarity correspondence;

Presentation type: Oral presentation / Talk

Session: Cross-dimensional compatibility effects between quantities, valence and space: Points of convergence and points of divergence

Are power differences in abstract language grounded in the visual modality?

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UMIT Tirol

Grounded cognition assumes that language is understood using simulations in different modalities. Evidence for this assumption mainly stems from studies using concrete concepts (e.g., action related language makes use of the motor system, concepts related to power are represented as vertical differences in visual space). However, less evidence for grounding exists for abstract concepts, which are assumed to be grounded via metaphors associated with them. In the present study, we investigated visual grounding of abstract concepts loosely related to power or the exercise of power in different ways. As stimulus material, we chose pairs of concepts, e.g., democracy and dictatorship. Participants were presented each word separately and asked to create a visual image in their mind. Then they were asked to rate images on several aspects, e.g., how spontaneous the image is, how colorful it is. Afterwards they were asked to draw a sketch of the image. Results showed systematic differences between more and less powerfully concepts in ratings and drawings, though results were not consistent for all pairs of concepts. Those inconsistencies were however related to the specific content of the concepts. For instance, images of more powerful concepts (e.g., wealth vs. poverty, wisdom vs. stupidity) were rated as more colorful, with the exception that democracy was rated as more colorful than dictatorship. This may be explained by the conception that democracies allow for more diversity and are thus, metaphorically, more colorful. In conclusion, abstract concepts related to power are grounded in the visual modality.

Keywords: grounded cognition, embodiment, abstract language, visual imagery

Presentation type: Oral presentation / Talk

Session: Embodiment and perspective taking

Do temporal regularity and attention modulate perceptual learning of random acoustic patterns?

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The formation of memory representations for novel sounds often relies on implicit perceptual learning. Memories are formed through repeated exposure, and successful learning facilitates perception. Such perceptual learning takes place even for random, complex acoustic patterns devoid of semantic content. However, less is known about whether memory formation is modulated by different features of the learning context. The current study explored the influence of two contextual factors: temporal regularity of pattern recurrence and listeners' attention. We adapted an established implicit learning paradigm in which listeners typically become better in detecting pattern repetitions embedded in random acoustic sequences for patterns that recur across multiple trials compared to non-recurring patterns presented in only one trial. Here we presented listeners with random acoustic sequences that contained temporally regular or jittered repetitions of sound patterns. During sound presentation, their attention was directed towards the acoustic pattern repetitions or away from the auditory stimulation. Overall, we found a memory-related modulation of the event-related potential (ERP) and an increase in inter-trial phase coherence for patterns that recurred across multiple trials (compared to non-recurring patterns). Remarkably, a memory-related ERP effect was present even for the first pattern occurrence per sequence when participants attended to the sounds, but not when they were engaged in a visual distractor task. These findings suggest that memory formation for unfamiliar sound patterns is robust against temporal irregularity and in-attention, but attention facilitates access to established memory representations for previously presented patterns upon first occurrence within a sequence.

Keywords: auditory perception, perceptual learning, auditory memory, acoustic patterns, EEG

Presentation type: Poster Presentation

Session: Auditory processing

The impact of phonological co-activation on written language switching

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Language switching has mostly been investigated when switching while speaking and not while writing. As a result, written language switching and the factors that may impact it are not well-understood. In a previous study (Roembke et al., under review), we showed that written language switching is highly facilitated for translation-equivalent word pairs that are identical orthographically (i.e., homographs: TIGER/TIGER [English/German]), even though they mismatched in phonology. Thus, switching facilitation might be the result of limited phonological co-activation when writing homographs, since phonology constitutes the only difference between the translations. In this experiment (planned N = 48; data collection ongoing), we investigated this

hypothesis more directly by manipulating the extent to which a word's phonology had to be activated during written picture naming. German-English bilinguals switched between naming pictures of homographs and quasi-homographs in their dominant versus secondary language. Participants responded by typing the word, and simultaneously spoke the same word in the corresponding language (type-and-speak), tapped their tongue (type-and-tongue-tap) or did neither (type-only). We predict that speaking while typing impairs switching performance for homographs as compared to type-only or type-and-tongue-tap, since language-specific phonology is most strongly activated in the type-and-speak condition. If confirmed, this would suggest that switching facilitation when typing homographs might be due to scarce recruiting of phonological representations when typing without speaking.

Keywords: Bilingualism, language switching, phonology, orthography, writing

Presentation type: Oral presentation / Talk

Session: Tell me and talk to me – the influence of language on goal-directed performance

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The intensity of auditory distractors: It does make a difference

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If you stop by my poster—I hope you do—I will show you the results of a recent preregistered replication study, which made an interesting combination of expected and unexpected results. In this study, we systematically examined the role of intensity in two types of auditory distraction. The first type of distraction is the changing-state effect (i.e., increased disruption by changing-state relative to steady-state sequences). The second type is the auditory deviant effect (i.e., increased disruption by auditory deviant relative to steady-state sequences). In previous experiments, the changing-state effect was independent of intensity. Our results confirmed this. Somewhat unexpectedly, however, we also found a main effect of intensity. Steady-state and changing-state sequences presented at 75 dB(A) were more disruptive than presented at 45 dB(A), suggesting that loud auditory distractors are more difficult to ignore after all, which may not sound all that surprising, but is at odds with all previous results. We also tested whether an unexpected increase in intensity is equally disruptive than an unexpected decrease. It was.

Keywords: Attention, distraction, memory

Presentation type: Poster Presentation

Session: Auditory processing

The role of facial muscle activity in explicit and implicit processing conditions: Sensorimotor simulation, emotional reaction or (evaluative) inference of content?

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Facial muscle responses to emotional facial expressions are seen as indices for the involvement of affect-related, physiological processes. Typically, people react with responses congruent to the visual percept, interpreted as “facial mimicry”, or sensorimotor simulation. However, sometimes emotional reactions not congruent to the visually perceived emotion are observed. Moreover, such responses are not observed under all processing conditions, so that it is still unclear when they are triggered, what they reflect and which function they serve. In the present study, we investigated the functional role of facial muscle responses under different processing conditions: Participants task was to intentionally categorize clearly visible emotional facial expressions (Exp. 1) of five emotion categories, or to categorize neutral-looking faces with regard to the allegedly felt emotion (i.e., joy, anger, fear, sadness, disgust) in a masked emotion misattribution procedure (Exp. 2). In both experiments, activity of five facial muscles as well as behavioral responses were assessed on a trial-by-trial basis. Results revealed emotion-specific facial muscle activity and correct categorization for visible intentional processing. Under masked presentation conditions, a specific behavioral pattern of emotion-congruent as well as cross-category misattributions was observed (e.g., anger-fear) similar to Rohr et al. (2015). Importantly, the observed facial muscle activity mirrored the cross-category misattributions and multi-level analyses showed that the activity contributed partially to the choice of the behavioral response. We discuss whether this pattern of results indicates an emotional reaction to the primes which is fed into the behavioral decision, or whether a semantic concept is inferred and then simulated.

Keywords: misattribution, emotion, affect, implicit processing, facial muscle activity, EMG, masked

Presentation type: Oral presentation / Talk

Session: Emotional faces in social cognition: New approaches and recent insights

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The power of words – Our aesthetic impression of a picture can be influenced by the valence of an accompanying word

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Specific contexts in which we live and act influence our attitude towards things we have experienced within them. By means of evaluative conditioning, it has been shown that emotions caused by one stimulus can be transferred to another given simultaneous occurrence in close proximity. We investigated the question of whether the emotional content of words (positive, neutral, or negative) influence the aesthetic judgement of pictures. Therefore we used pictures of chairs, which were randomly assigned to words of different valence categories (e.g. holidays, stairs, betrayal). In the conditioning phase, a single chair picture was paired with one word and participants were instructed to look at both, pictures and words in order to memorize them. For attention control in this online-study, deviant pictures and words with orthographic errors had to be detected. Following the conditioning phase, the chair pictures were judged concerning their aesthetic impression by use of a questionnaire that captured complexity, beauty, coherence, conciseness, and aesthetic impression. At the end of the experiment, effective conditioning was checked and participants rated the valence of the pictures. Results showed that conditioning of valence was successful: Pictures of chairs paired with positive words were considered more positive than pictures paired with negative words. A similar pattern of results emerged for the aesthetic judgement: Pictures shown together with positive words were considered more aesthetically pleasing than pictures paired with negative words. The results demonstrate that valence triggered by single words affect the aesthetic impression of pictures.

Keywords: Experimental Aesthetics, Perception, Evaluative Conditioning, Words

Presentation type: Poster Presentation

Session: Emotion cognition

Does the Affect Misattribution Procedure Reflect Gradual Differences in (Affective) Prime Valence?

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As the Affect Misattribution Procedure (AMP) is often used to measure interindividual differences in attitudes, a crucial question is how well the AMP reflects differences in the strength of attitudes. We approached this question by examining to what extent the AMP reflects gradual differences in prime valence. We also explored whether affective processes play a role in this regard. We used a modified AMP with a scalar response format in all experiments. Gradual differences between primes were generated in two ways: by selection of pictures according to normative ratings and by emotion regulation. In Experiment 1 (n = 55), we varied prime valence by selecting neutral, moderately and extremely positive pictures based on normative ratings from the IAPS. We additionally varied the arousal of the primes. In Experiments 2 (n = 81) and 3 (n = 142), participants first downregulated the intensity of their affective responses to positive or negative IAPS pictures by different emotion regulation strategies (distancing and reinterpretation). In a subsequent AMP, these pictures were used as primes. We found that the AMP reflected

gradual differences of the prime valence when manipulated via the selection of stimuli according to normative ratings, whereas we found no reduction of AMP priming effects when the affective intensity of the primes was reduced by emotion regulation. Arousal did not play a role, presumably because the targets were to be evaluated in terms of valence. We assume that fast evaluations of the prime valence, retrieved from memory, determine AMP responses.

Keywords: AMP, affective valence, arousal, emotion regulation, distancing, reinterpretation

Presentation type: Poster Presentation

Session: Emotion cognition

The Replication Database: Making transparent what replicated and what did not

Lukas Röseler, Christopher Albert Doetsch, Taisia Gendlina, Noah Klett, Josefine Krapp, Noemi Labusch, Leonard David Kaiser, Astrid Schütz

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When building on other people's findings, researchers are faced with the fact that a considerable proportion of these findings do not replicate. To facilitate the separation of the wheat from the chaff in a system where the publication of replication attempts is still associated with their outcome, we created the Replication Database (ReD). Via an interactive website, researchers can search and summarize replication attempts from a community-augmented dataset that includes studies from the Reproducibility Project Psychology, Many Labs studies, results registered on the OSF, individually submitted replication attempts, and many more. The database including all data and code is available online: https://metaanalyses.shinyapps.io/replicationdatabase/

Keywords: replication, database, meta-analysis, reproducibility, crisis

Presentation type: Oral presentation / Talk

Session: Replicability

No evidence for differential effects of chronotype and time of day on controlled and automatic processes at memory retrieval

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An individual's chronotype determines their peak of circadian arousal. Morning chronotypes have their circadian peak in the morning. Evening chronotypes have their circadian peak in the evening. Empirical evidence seems to suggest better performance when controlled cognitive processes are tested on circadian peak in comparison to when they are tested off circadian peak. By contrast, better performance is observed for automatic cognitive processes when they are tested off circadian peak in comparison to when they are tested on circadian peak. Crucially, this line of research mostly relied on separate tasks to assess controlled and automatic cognitive processes which—given separate analysis strategies for the separate tasks—may result in a confirmation bias. Hence, the primary goal of this study was to control for a potential confirmation bias by means of a Continuous Identification with Recognition task which allows to simultaneously assess controlled (i.e., item recognition) and automatic (i.e., repetition priming and fluency) processes for the same stimuli within the same task. Preliminary results based on 160 participants suggest that there is no simultaneous differential influence on controlled and automatic processes as a function of chronotype and time of day. We conclude that current theories in the field may not withstand stricter testing and analysis strategies which simultaneously consider controlled and automatic processes based on the same stimuli within the same task.

Keywords: memory, recognition, priming, fluency, chronotype, time of day, circadian arousal

Presentation type: Oral presentation / Talk

Session: Learning and memory retrieval

The naming paradigm in sound symbolism research

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Sound symbolism research uses mainly two types of empirical paradigms. First, corpus analyses examine whether there is an association between sub-lexical word features (e.g., phonemes) and meaning. Second, in pseudo-word experiments, participants see one or two artificially created words per trial and are asked to match these words to objects (e.g., the BOUBA-KIKI- or TAKETE-MALUMA-Effect). The present talk discusses the naming paradigm, which shares advantages with both the pseudo-word paradigm and corpus analyses. In this paradigm, participants are typically asked to listen to a short excerpt from an unfamiliar language and then invent pseudo-words that, subjectively, resembles words from the unfamiliar language. Participants are asked to invent one pseudo-word as a name for each of several objects. Hitherto, the naming paradigm has been employed mainly to examine valence sound symbolism. Exemplarily, we will report one of these valence sound experiments, which compares novel names for faces with positive and negative valence in native speakers of Japanese and German. We demonstrated that the vowel /i/ was associated to positive valence and the vowels /o/ and /u/ were associated to negative valence. The second experiment investigates the BOUBA-KIKI-effect. Here we observed that the names for spikey shapes included more frequently the letters T, and -surprisingly- S, Z and R and the names for round shapes included more frequently the letters L, O, M, B, and -

surprisingly- H. We will argue that the naming paradigm has several advantages compared to the paradigms usually preferred in research on sound symbolism.

Keywords: Sound Symbolism, Iconicity, Language, Emotional Valence, Psycholinguistics

Presentation type: Oral presentation / Talk

Session: Sound Symbolism: Phenomena, Methods, and Psychological Processes

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Anticipatory Models of Cognitive Processes for Real-Time Action Decisions

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Cognitive models within a cognitive architecture such as ACT-R simulate cognitive processes involved in a given task. Anticipatory models rather try to trace the cognitive state of the participant during task execution that include the goals and subgoals, but also information processed and situation understanding, while the task is executed. Anticipatory models are different in the way that they receive information about incoming (information perceived) and outgoing events (measured events such as gaze shifts, BCI, motor actions, …) while the participant works on the task. Such anticipatory models (e.g., also using cognitive architectures) can close the gap between psychological experiments and theory driven modelling approaches by testing theories on individual traces of interactions in real time. This type of model not just enables a deeper understanding how humans interact in complex dynamic environments but also sheds light on individual behavior that evolves on prior decisions and environmental factors and on human in-the-loop decision making. Examples of research that involves such models will be given for interactive tasks, such as anticipation of individuals in sequential decision tasks, anticipation of airplane pilots, for take-over situations in highly automated driving and for human robot interaction. It will be discussed how these models can contribute to exiting research and what challenges still needs to be faced e.g., to adjust evaluation procedures taking into consideration individual traces.

Keywords: Cognitive modelling, anticipation, applied, tracing

Presentation type: Oral presentation / Talk

Session: Modeling and experimental validation in real-life environments

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Attention Bias for anxiety-linked stimuli – Delayed Disengagement or Behavioral Freezing?

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Altered attentional processes for anxiety-linked stimuli are well known. However, it is still unclear whether slower response times in the presence of anxiety-linked stimuli are due to attentional processes, particularly delayed disengagement, or due to freezing, a behavioral response in the face of a threatening situation. Three criteria are necessary to differentiate between delayed disengagement and behavioral freezing: (1) Control of behavioral freezing, (2) control for even distribution of initial focus of attention, and (3) control of the ease with which attention is shifted. We adopted a circular visual search paradigm that met these three criteria. Therefore 80 participants, matched by age and gender, conducted an eye-tracking experiment in two anxiety groups (low vs. high). In the experiment, participants had to saccade away from an irrelevant picture in the center of a screen that could be congruent, incongruent, or neutral to the target. The target was a peripheral anxiety-linked (for high anxiety) picture with a specific feature (direction left or right) to which participants had to respond. We could first replicate previous findings for delayed disengagement for congruent pictures, independent of whether the pictures were anxiety-linked. We further could demonstrate that the high anxiety group compared to the low anxiety group, showed slower manual response times in all conditions. At the same time, they did not differ in disengagement times. Thus, our results indicate that the so-called attentional bias may not be an attentional process but rather a behavioral freezing reaction in the presence of threatening stimuli.

Keywords: attentional bias, delayed disengagement, freezing, eye tracking

Presentation type: Oral presentation / Talk

Session: Emotion

A multiverse study for extracting differences in P3 latencies between young and old adults

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It is well established that P3 latencies increase with age as part of cognitive aging. Investigating these age-related latency differences requires numerous methodological decisions, resulting in pipelines of great variation ultimately limiting the comparability of results from different studies. The aim of the present work is to investigate the effects of different analytical pipelines on the age effect in real data. Therefore, we conducted a multiverse study and varied the low-pass filter setting (4 Hz, 8 Hz, 16 Hz, 32 Hz), the latency type (area vs. peak), the level of ERP analysis (single participant vs. jackknifing) and the extraction method (manual vs. automated). 30 young (18 – 21 years) and 30 old (50 – 60 years) participants completed three cognitive tasks (Nback task, Switching task, Flanker task), while an EEG was recorded. The results show that different analysis strategies can have a tremendous impact on the detection and magnitude of the age effect, with effect sizes ranging from 0% to 96% explained variance. Likewise, regarding the psychometric properties of P3 latencies, we found that the reliabilities fluctuated between rtt = .13 and 1.00, while the homogeneities ranged from rh = -.18 to .86. Based on predefined criteria, we recommend applying a tight low-pass filter and performing

manual extraction, especially when dealing with noisy data and using peak latencies at the individual participant level. Furthermore, our findings add to the evidence that jackknifing combined with peak latencies can lead to non-informative results, as illustrated here by severe overestimation of effect sizes.

Keywords: ERP, age, jackknifing, latency, P3, multiverse analysis

Presentation type: Oral presentation / Talk

Session: Applied attention

Understanding Sharing Behavior on Social Media Platforms - The Influence of Knowledge and Confidence

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Social media has shaped our world in the last decade. Recently however, the initial enthusiasm transformed into concerns about the dangers of unchecked sharing of false information. This has prompted a large body of research about interventions to improve peoples' abilities to spot falsehoods as well as to limit sharing of false information. To gain a deeper understanding of the cognitive underpinnings regarding sharing behavior on social media platforms we conducted two experiments (N = 434 & N = 526) assessing participants' sharing intention. The first experiment assessed COVID-19 knowledge while the second additionally assessed climate change, nuclear power, marijuana, veganism, and speed limit knowledge. We implemented two interventions on our social media platform ChirPing – (i) priming to focus on information accuracy and (ii) manipulating the deliberation time – assessing whether knowledge about the presented information and confidence in this knowledge moderate intervention effects. Intervention results were mixed, hinting towards an increased sharing of false information with less deliberation time. In both studies, knowledge and confidence affected sharing intentions of true and false information differently: more accurate knowledge was only associated with a lower sharing intention of false information (no impact on true information). Higher confidence in knowledge, however, was only associated with a higher sharing intention of true information (no impact on false information). This not only suggests that increasing deliberation time might be an effective intervention against sharing of false information but also stresses the importance of differentiating between sharing of true and false information in further research.

Keywords: Social media, False Information, Sharing, Knowledge, Confidence

Presentation type: Oral presentation / Talk

Session: False information and memory

How gaze synchronization metrics predict performance in video-based e-learning

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In online lectures, using signaling (e.g., with a digital pointer) provides known benefits for learners as it provides an explicit means of directing the learners' attention. In addition to providing this directive, it accomplishes a synchronicity between the learners attention. But does general synchronicity in eye movements predict learning success? In two studies, we investigated, to which extent learners follow a digital laser pointer on the slide in two conditions (with and without an on-screen instructor) and whether gaze synchronization metrics predict learning success (i.e. post-quiz performance). We found that gaze synchronicity (how synchronous an individual is to the average of all learners) can predict learning success. In addition, the average distance between the learner's gaze and the pointer position predicts the student's quiz performance, independent of the presence of an on-screen instructor. These insights can help in creating automated immediate-feedback systems for educational videos.

Keywords: eye movements, learning, attention

Presentation type: Poster Presentation

Session: New media and machine interaction

Offloading the prospective and retrospective components of prospective memory

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Forgetting to perform an intended action at the appropriate future moment – i.e., prospective memory (PM) – is reported as the most frequent memory failure in our everyday life. In order to relieve the burden of intention maintenance in internal memory and increase the likelihood of remembering to carry out these delayed intentions, we can rely on the external environment. For instance, this may involve setting a reminder such as an alarm or calendar alert or keeping a to-do-list. The use of physical actions to create external triggers for delayed intentions is referred to as *intention offloading*. Despite the relevance of intention offloading behavior for everyday functioning, little research has been conducted to understand this process and its development across the lifespan. The goal of this study is to determine under which conditions reminders benefit prospective memory. A sample of younger and older adults will be asked to perform a prospective memory task and we will manipulate if and which PM component they can offload. The results will shed light on the most effective strategies to support the fulfilment of delayed intentions in younger and older adults.

Keywords: Prospective Memory, Cognitive Offloading, Reminders, Delayed Intentions, Cognitive Ageing

Presentation type: Oral presentation / Talk

Session: Forgetting

Temporal expectations in dual tasking: Evidence for proactive resource sharing?

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The present study explored how deviations from the expected time point of a secondary task affect dual task performance. In two psychological refractory period experiments, participants responded to two tasks separated by either a short or long delay. In contrast to traditional dual tasking studies, however, the identity of the first task probabilistically predicted the delay at which the second task would occur. Violations of these expectations impaired Task 2 as well as Task 1 performance. For Task 1, this effect was more pronounced when Task 2 occurred earlier than expected, while for Task 1, it was more pronounced when Task 2 occurred later than expected. The data pattern is consistent with the idea that sharing of processing resources can be proactively scheduled (i.e., based on early available Task 1 features) and re-allocated when predictions are violated.

Keywords: capacity sharing, psychological refractory period, time expectancy

Presentation type: Poster Presentation

Session: Cognitive flexibility

Object based attention: Target identity in a discrimination task inverts the same object advantage

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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). 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. We found that the same object advantage could only be replicated in cases where the to be judged details are different. If the targets are identical, a same object disadvantage emerged. These results replicate findings of Chen and Huang (2015) with response times as the dependent variable. The same object advantage (for different targets) and disadvantage (for identical targets) 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: object based attention, visual attention

Presentation type: Poster Presentation

Session: Visual attention

Assessing Metamemory Beliefs with Indirect Measures

Franziska Schäfer, Monika Undorf

University of Mannheim

It is widely accepted that metamemory judgments such as people's predictions of their future memory performance during learning (judgments of learning, JOLs) rely on an experience-based process (i.e., fluency) and a theory-based process (i.e., metamemory beliefs). Whereas research initially focused on examining the contribution of fluency to JOLs, recent research addresses the role of metamemory beliefs. Nevertheless, there are many open questions regarding the measurement and the nature of metamemory beliefs. For example, it is unknown to what extent demand characteristics afflict established measures of metamemory beliefs. The present research aimed to address this question by using an indirect measurement approach to assessing metamemory beliefs and their contribution to JOLs. In two preregistered experiments (N = 128 each), we examined whether indirect measures capture beliefs about how font size affects memory and explain the contribution of metamemory beliefs to the font-size effect on JOLs. In each experiment, participants studied words in small and large font sizes, provided JOLs, and took a free recall test. We assessed participants' beliefs about font size indirectly through the Implicit Association Test (Experiment 1) and the Propositional Evaluation Paradigm (Experiment 2) and directly through global performance predictions. JOLs and both belief measures revealed that participants expected to remember words printed in large font sizes better than words printed in small font sizes. However, only direct beliefs explained the font-size effect on JOLs. Our results thus indicate that direct measures of metamemory beliefs are better suited to capture metamemory beliefs than indirect measures.

Keywords: Metamemory, Judgments of learning, Indirect measurement

Presentation type: Oral presentation / Talk

Session: Learning and encoding

Creating a common taxonomy of “biased” information search

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When making decisions, passing judgments, or testing hypotheses, people often search for additional information to find the best course of action or to evaluate their final choice. In these types of situations, research has consistently shown that there is a preference to search for information on the option/hypothesis that people currently prefer or believe to be true. This type of information search is so widespread that it has been published in different areas of psychology and under many different names, for example, selective exposure (e.g., Frey, 1986), confirmation bias (e.g., Nickerson, 1989), and positive test strategies (e.g., Klayman & Ha, 1987), just to name a few. Just as widespread as the phenomena are theories and potential explanations for it. In this project, I propose that the common core of these search phenomena is the striving for a consistent representation of the surrounding world and the self. Therefore, observed differences between search phenomena may stem from the activation of different mechanisms of striving for consistency. These mechanisms can range from reinterpreting the available information to adjusting currently-held attitudes and can be applied to different levels of the task. Based on these assumptions, I strive for a common taxonomy of “biased” search processes which aims to identify differences and commonalities between the published search phenomena and their underlying theories. This taxonomy will be the first step in reconciling the different streams of literature and provide a basis to empirically disentangle the contributions of different cognitive and motivational processes to “biased” information search.

Keywords: theory integration, information search, decision-making, striving for consistency

Presentation type: Oral presentation / Talk

Session: Attitude formation and decision making

Recent Advances in TVA-based Research: An Overview

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In recent years, there have been repeated attempts to use TVA outside its core methodological area – whole- and partial-report experiments with masked letters and numbers. These advances reflect the aim to use TVA with more diverse stimulus materials and with other experimental paradigms, owing (among other aspects) to the desires of using more realistic stimuli, embedding attention assessments in less artificial contexts, and advancing the theory in new directions So far, these further developments are rather scattered and not very systematic. Moreover, they tend to use TVA as a tool rather than aiming at its theoretical development. In our overview, we briefly review core

concepts of TVA and discuss recent progress with new stimulus material and tasks. We will critically reflect on these developments and point out research gaps.

Keywords: visual attention, TVA

Presentation type: Oral presentation / Talk

Session: Advances in TVA-based visual attention research I: Basic and Applied

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A short-term reduction of the number of candidate tasks affects n – 2 repetition costs

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N – 2 repetition costs are one of the most straightforward indications of the involvement of inhibitory processes in task switching. In the present study, we implemented a modified task switching paradigm with two kinds of cues. One type of cue consisted of a standard task cue indicating which task to perform in the upcoming trial, while in half of the trials, this cue was preceded by another cue (pre-cue) which reduced the set of candidate tasks from three to two in Experiment I, and from four to three or from four to two in Experiment II. Results revealed a significant interaction of Task Sequence and Pre-Cue: n – 2 repetition costs were visible with three candidate tasks, while they were reduced to zero if the set of candidate tasks was reduced to two. This result is interpreted in terms of an establishment of antagonistic constraints among the two remaining tasks, thereby facilitating task set activation and reducing the need for inhibition.

Keywords: Task switching, inhibition, n-2 repetition costs

Presentation type: Poster Presentation

Session: Cognitive flexibility

No impact of age on performance in a crossmodal task-switching paradigm

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The congruency effect refers to the difference in performance between congruent and incongruent trials. This congruency effect sometimes is asymmetric. More specifically, in general the visual modality tends to dominate the auditory modality (i.e., visual

dominance effect). Accordingly, an asymmetric congruency effect (ACE) between auditory and visual target stimuli has been consistently observed when switching between these two modalities: attending an auditory target with a concurrent visual distractor leads to worse performance than vice-versa. Besides, aging is accompanied by specific impairments, especially with regards to stimulus modalities and task-switching (at the mixing-costs level). However, to our knowledge, no study ever investigated the role of aging when switching between target modalities with concurrent distractors in another modality. In our experiment, we exposed younger and older participants to unimodal central cues, followed by bimodal lateralized stimuli. They answered manually depending on the target stimulus modality (i.e., spatial judgment task with compatible spatial mapping). As expected, we found an ACE, as well as an over-impairment in mixing-costs for older adults. However, results showed no specific age-related deterioration with regard to the asymmetric congruency effect. This tends to indicate that older adults, compared to younger adults, are equally impaired in crossmodal task-switching.

Keywords: Aging, crossmodality, task-switching, spatial selective attention

Presentation type: Poster Presentation

Session: Cognitive flexibility

Episodic Bindings of Abstract Task Sets

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Performing a certain task requires the organization of cognitive processes and related mental representations which can be referred to as 'task set'. Task sets may be organized on the level of concrete perceptual features, such as stimuli or responses, but may also be processed on more abstract levels, independent of immediately perceived features. While research around episodic binding has shown that retrieval of previously bound concrete perceptual features affects task switching performance, it remains unclear whether this extends to task sets processed on an abstract level. In a series of experiments, we use a task switching paradigm that allows us to investigate processing of abstract task sets operating independently from specific stimuli and responses. To test for the effect of bindings between context features and the concurrent abstract task set, we experimentally manipulated visual context. Results indicate preliminary evidence in favor of the hypothesis that abstract task sets are subject to binding and retrieval processes.

Keywords: Binding, Task Switching, Task Sets

Presentation type: Poster Presentation

Session: Cognitive flexibility

Neural, cognitive and visual processes underlying rule learning and memorization in probabilistic value-based category learning

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Categorization allows humans to effectively structure the world and to predict decision outcomes using the features of the to-be-classified objects (e.g., edible and poisonous mushrooms based on color or shape). Often, such decisions promise more or less rewarding consequences, which, however, are often not perfectly informative about the true categories (e.g., edible mushrooms sometimes lead to gastric problems). Further, research suggests that category learning involves rule- and memory-based cognitive processes depending on the category structure (e.g., color predicts the categories vs. perceptually unstructured categories). Here, we study in depth how humans solve such problems under probabilistic reward-feedback in a multi-method approach, using fMRi, eye tracking and cognitive modeling. For this, we used the well-studied categorization problems known as Type II and VI (rule-based vs. unstructured, with eight objects, each containing three attributes), however, adjusted to reflect a value-based preferential choice. Participants learned via trial-and-error, which of two simultaneously presented objects predicted reward or no reward, after instructing that either a rule or memorization will allow to maximize their rewards. For analyses, we employed the novel Category Abstraction Learning model (CAL; Schlegelmilch, Wills & von Helversen., 2021), a hybrid model including interacting processes of rule learning and memorization. We show, that CAL not only explains individual differences in learning behavior (sudden vs. incremental in rule-based vs. unstructured), but also predicts, via cross-validation, (a) when humans start to maximize their rewards, (b) dissociable neural correlates (rule vs. memory strategies), and (c) selective stimulus attention during preference formation, as well as during reward-processing.

Keywords: Categorization, Preference, Memorization, Abstraction, Eye Tracking, Brain Systems, Modeling

Presentation type: Oral presentation / Talk

Session: Learning and models

Grocery shopping under simplified marginal value theorem predictions

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In the past, the marginal value theorem (MVT) has been successfully applied to animals foraging for food, but no attempts have been made to apply it to human food foraging

behavior in the patch context of supermarkets. Based on the MVT, this study established simplified predictions about the quantitative relationship between gain in Euro and patch residence time well as the relationship between travel time between patches and patch residence time. *N* = 190 participants were interviewed about their current shopping context at a German supermarket and gave estimates on their travel time, patch residence time and gain. A subset was selected consisting of *n* = 61 participants who mainly shopped at that supermarket, traveled straight from home and back instead of shopping on the way somewhere else, and traveled by foot. An asymptotic model was fitted to their estimates on patch residence time and gain via nonlinear regression. The resulting model predictions on their economical travel times were compared to participants' estimates. Reported gains and patch residence times generally showed the relationship predicted by the model with a tendency towards overmatching. The observed relationship between reported patch residence times and travel times showed some differences to the model predictions. Using participants' estimates instead of measuring time and gain might have been too inaccurate a basis for the model predictions. Interindividual differences in gain and cost functions may be observed and cost factors such as exhaustion may need to be taken into account in future studies.

Keywords: optimal foraging, marginal value theorem, supermarket, humans

Presentation type: Poster Presentation

Session: Health and environment

The Role of XAI in the Comparison of Human and Automated Agents with respect to Justice Perceptions

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Driven by advances in artificial intelligence, automated systems increasingly automate decision-making. Especially in organizations where distributions are automated systems might influence justice perceptions of employees regarding the distribution of outcomes, the processes, the transparency, and the interpersonal treatment of decision-making – factors that reflect the four facets of organizational justice: distributive, procedural, informational, and interpersonal justice (Colquitt, 2001), which are known to positively affect i.a. employee's job motivation and satisfaction. We aimed to understand whether the introduction of automated agents changes justice perception in comparison to human decision-making, and which role agent's explanations play with respect to justice perceptions of decision recipients. In this talk we present preregistered and published findings of a fully randomized 2 (agent: automated vs. human) x 3 (explanation: equality-explanation vs. equity-explanation vs. no explanation) between-subjects study. Participants were recruited from the healthcare sector (N = 209) and responded to an online survey. Results showed that perceptions of interpersonal justice were stronger for the human agent. Participants perceived human agents as offering

more voice and automated agents as being more consistent in decision-making. When given no explanation, perceptions of informational justice were impaired only for the human decision agent. In the study's second part, participants took the perspective of a decision-maker and were given the choice to delegate decision-making to an automated system. Exploratory analyses suggest that participants delegating an unpleasant decision to the system frequently externalized responsibility and showed different response patterns when confronted by a decision-recipient who asked for a rationale for the decision.

Keywords: automated decision-making, human-computer interaction, HCI, justice, XAI, scheduling

Presentation type: Oral presentation / Talk

Session: Experimental Engineering Psychology

Recent advances in binding and retrieval in action control

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In this general introduction to the symposium, the three chairs introduce the basics of feature binding theoretical accounts that is the foundation for many of the presented topics. At its core, this literature assumes that stimulus and response features are bound into so-called event files. These event files linger for some time after their creation and can be retrieved in later episodes, affecting behavior in subtle ways. This introduction will cover the concept of event file, the duality of binding and retrieval processes, and commonly used research methods.

Keywords: Action Control, Binding, Retrieval

Presentation type: Oral presentation / Talk

Session: Recent advances in binding and retrieval in action control I: Learning, task switching, music, and neural correlates

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S-R Binding and Figure-Ground Segmentation - Revealing Unanticipated Effects of Display Complexity

Philip Schmalbrock, Christian Frings

Trier University

Being able to act with intention requires a plethora of different processes to work together so that ultimately an intended action is achieved. This does not only include action-related processes but also requires the integration of perceptual information with elements of an action - this integrated representation is often called event file. Recent work showed that visual input that is perceived as background information is actually not considered for integration into event files and later retrieval from these files. Yet, other research from this action control literature suggests that a reevaluation of these findings is necessary. That is, so far stimulus / display complexity has largely remained as simple as possible – which possibly occlude relevant effects or even induced effects. We here reinvestigate previous findings regarding background information in action control but in a more complex experimental environment. Our findings highlight the need to consider complexity as a main driver of action control.

Keywords: S-R binding, Figure-Ground Segmentation, Complexity

Presentation type: Poster Presentation

Session: Stimulus-response and response-effect binding

A theory of visibility measures in the dissociation paradigm

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Research on perception without awareness primarily relies on the dissociation paradigm, which compares a measure of awareness of a critical stimulus (direct measure) with a measure indicating that the stimulus has been processed at all (indirect measure). We argue that dissociations between direct and indirect measures can only be demonstrated with respect to the critical stimulus feature that generates the indirect effect, and the observer's awareness of that feature, the critical cue. We expand Kahneman's (1968) concept of criterion content to comprise the set of all cues that an observer actually uses to perform the direct task. Different direct measures can then be compared by studying the overlap of their criterion contents and their containment of the critical cue. Because objective and subjective measures may integrate different sets of cues, one measure generally cannot replace the other without sacrificing important information. Using a simple mathematical formalization, we redefine and clarify the concepts of validity, exclusiveness, and exhaustiveness in the dissociation paradigm, show how dissociations among different awareness measures falsify simple theories of "consciousness", and formulate the demand that theories of visual awareness should be sufficiently specific to explain dissociations among different facets of awareness.

Keywords: Awareness measures, dissociation paradigm, consciousness, psychophysics

Presentation type: Oral presentation / Talk

Session: New methodological approaches to measuring unconscious mental processes

Can people better express their understanding of system functioning graphically or verbally?

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People must often understand how complex systems work to successfully interact with them. To assess whether these mental representations of system functioning are accurate, different methods are available. One is concept maps – graphs that connect concepts (e.g., system goals, functions, components, characteristics) via labeled links to specify their relationships. However, people may not be able to express their actual understanding of system functioning using this abstract method, compared to when they can simply explain it verbally. Therefore, the present study examined how concept maps as representations of system functioning depended on the method used to elicit them (i.e., graphical construction or verbal description). Participants received instructions on how to explain system functioning via functional abstraction hierarchies and on how to construct concept maps. Subsequently, they explained two everyday systems (bike ride, washing dishes), one by constructing a graphical concept map and one verbally. In both conditions, a set of pre-defined concepts was provided. From the verbal descriptions, the authors subsequently constructed concept maps. Both types of maps were evaluated using a master map that correctly represented the functional abstraction hierarchy. Compared to the verbal condition, maps from the graphical condition contained fewer redundant and more functional relationships. They also took over three times longer to complete, but this drawback seems acceptable in light of the other results. While training is needed to construct accurate and useful concept maps, the present study shows people can describe system functioning more accurately when using concept maps compared to verbal descriptions.

Keywords: concept maps, mental model measurement, understanding of system functioning, knowledge elicitation, functional abstraction hierarchies

Presentation type: Poster Presentation

Session: New media and machine interaction

The repetition-based truth effect: Reduced discrimination ability or shift in response bias?

Oliver Schmidt, Daniel W. Heck

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The repetition-based truth effect refers to the phenomenon that repeated statements are more likely judged as ‘true’ than new statements. Although the truth effect has been

studied for decades, it is not fully clear yet whether it reflects a reduced ability of discriminating between true and false statements or a shift in response bias towards judging statements as 'true'. To address this question, we adopt the two-high-threshold model (2HTM) for truth judgments (Hilbig, 2012), a multinomial model assuming that two processes determine observed judgments (i.e., knowledge and guessing). The model assumes that repetition leads to a response-bias shift conditional on the lack of knowledge and is thus equivalent to the knowledge-conditional model proposed by Fazio et al. (2015). In contrast, the fluency-conditional model assumes that knowledge is used only when not relying on a general, fluency-induced response bias, which overall results in a reduced discrimination ability. To test the models against each other, we use a standard truth-effect paradigm and manipulate prior knowledge by selecting easy and difficult questions. Additionally, we manipulated guessing by informing participants about the base rate of true and false statements as well as incentivizing responses in line with the base rate manipulation. We assessed the model fit and fit the observed response patterns using receiver operating characteristic (ROC) curves.

Keywords: truth judgements, multinomial processing tree models, cognitive modeling, receiver operating characteristic

Presentation type: Poster Presentation

Session: New media and machine interaction

Suppression-induced forgetting of motor sequences

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To examine *motor* suppression-induced forgetting, we adapted Anderson and Green's (2001) original *think/no-think* paradigm for motor sequences as items, thus exploring the effects of repeatedly and deliberately suppressing retrieval of motor sequences on their later recall in two experiments. Following learning, wherein participants had to associate several motor sequences with different letter cues and to also execute them in repeated trials, a *think/no-think* phase began. Herein, a subset of these sequences was to be executed in the same way as in the learning phase (*think* trials), whereas other sequences were to be deliberately suppressed in execution as well as in recollection. In such *no-think* trials the letters were shown, but participants were instructed to not execute the corresponding motor response as well as to additionally even try to hinder it from entering conscious awareness. Results revealed that suppressing motor retrieval impaired later memory performance for these sequences in comparison to *baseline* items that did not appear after their initial training. Moreover, suppression trials impaired later recall accuracy and execution speed in different ways: with higher initial training (Experiment 1), suppression impaired reaction time, but not recall accuracy; whereas lower initial training (Experiment 2) led to reduced recall accuracy. A cross-experiments reaction time analysis for suppressed sequences revealed a robust slowing of movement execution. This shows that voluntarily engaged inhibitory control processes during retrieval suppression influenced the very memory

representation of these sequences, not just by only reducing their accessibility but also by slowing down their execution, once recollected.

Keywords: suppression-induced forgetting; inhibition; executive control; forgetting; motor sequences

Presentation type: Oral presentation / Talk

Session: Forgetting

Emotion Recognition – A Battle of Accuracy between Physiological Measurements and Computer Vision

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Nowadays, computer algorithms are available on the market that claim to accurately predict expressed emotions from video clips showing facial expressions. However, the validity and accuracy of these algorithms is still debated. We investigated whether computer vision algorithms or laboratory-based psychophysiological measurements are more accurate in the recognition of happy, neutral, and disgust expressions in response to visual emotional stimuli. Participants (N = 30) viewed emotional pictures from the IAPS and other databases, gave valance and arousal ratings, and had to select the basic emotion that best fitted their reaction towards the presented stimulus. We recorded EDA-, heartrate-, facial EMG-, and EEG-data and videotaped participants facial expressions towards the stimuli. For analyzing the video recordings, we applied the two open access algorithms OpenFace and rPPG, which extract facial action units and heart rate data from video files. Supervised machine learning algorithms were then used for predicting valance and arousal ratings and self-selected universal emotions. We compared recognition performance between the algorithms and the psychophysiological data. In line with limited prior research, we found that the applied computer vision algorithms were able to accurately recognize happy reactions but could not distinguish between disgusted or neutral reactions. In contrast, our psychophysiological data showed a higher accuracy across all emotional reactions and were more reliable in separating the three stimuli categories. This pattern of results demonstrates the boundaries of applicability of available computer vision algorithms in emotion recognition.

Keywords: Emotion recognition, Psychophysiology, EEG, Automatic facial coding, IAPS

Presentation type: Oral presentation / Talk

Session: Emotion and cognition

The boundaries of binding: Task-, response-, and modality-dependence for binding and retrieval in action control

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When responding to stimuli, it is assumed that response and stimulus features are bound into a common representation – a so-called event file. If any component of the event file repeats, the previous information is retrieved, affecting performance. Action control theories commonly assume binding and retrieval to be ubiquitous processes affecting all actions; in turn, the resulting so-called binding effects should be observed irrespective of task type, modality of the target, and so on. In this talk we present research that offers clear limitations to this assumption, by merging ideas and findings of action control with related fields such as attentional orienting and visual search. First, binding effects are task dependent, in that they typically do not occur in detection and localization performance. Second, it is possible to spur on the occurrence of binding effects in such task types, for example, by introducing specific response mappings. Third, some of these findings differ for auditory and visual targets, suggesting modality dependence for binding effects in action control. Importantly, all these limitations do not fit into a framework of omnipresent processes affecting all actions.

Keywords: action control, attentional orienting, stimulus-response binding

Presentation type: Oral presentation / Talk

Session: Recent advances in binding and retrieval in action control II: Discarded action plans, event segmentation, and boundaries

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Anthropomorphism and the influence of naming of objects

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Anthropomorphism describes the tendency to assign human attributes, characteristics, motivations, intentions, or emotions to non-human entities, such as animals or inanimate objects. For instance, people perceive faces and facial expressions in car fronts by seeing the headlights as eyes and the grille as a mouth. There are several determinants and aspects that lead to anthropomorphism, including the need for social contact. In addition to an object's appearance or movement, the naming of objects also plays an important role in this framework. In the study discussed here, we investigated whether naming – i.e., assigning an individualized, personal proper name to a specific object, device or appliance, such as naming a robot vacuum cleaner "Snuggles" or "Mr.

Dusty" – leads to anthropomorphism independently of other factors. This was explored by means of an experiment using an online questionnaire. The effect of different ways of naming objects with regard to anthropomorphism was investigated. This was done using various questions about, for example, purchase and repair intentions, which people answered using a rating scale. The results of this study show that a self-chosen proper name had significantly higher values in terms of anthropomorphism than at least one other variant of naming (no name, company/brand name or pre-chosen proper name). These findings could be used in marketing, for example to increase product sales, but also to increase consumer referrals.

Keywords: anthropomorphism, names, naming, objects, devices, self-selected name

Presentation type: Oral presentation / Talk

Session: Human machine interaction and social cognition

Time for an update: Belief updating on the basis of ambiguous scientific evidence

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Scientific evidence for many effects tends to be ambiguous. While the scientific community may be used to the ambiguity of study results, this may not be true for the general public, as suggested by, for example, public reactions to the "replication crisis". We investigated how people update their preexisting beliefs about psychological effects based on ambiguous scientific evidence. Specifically, we investigated influences of subjective expertise, trust in psychological science, and the number of studies investigating an effect, as well as systematic strategies of belief updating. In an online experiment (N = 297), we presented participants a series of fictitious psychological hypotheses. For each hypothesis, they first had to rate their preexisting belief about the validity of the effect and their subjective expertise on the topic. Participants were then presented a series of fictitious study outcomes, some of them finding confirmatory and some finding contradictory evidence. Finally, they were asked to rate their posterior belief. Controlling for scientific literacy and education, we found a negative effect of subjective expertise and positive effects of trust in psychological science and number of studies on belief updating. We did not find evidence for systematic belief updating except for a strategy according to which participants weight the outcome of the most recent study stronger than that of previous studies. The results advance our understanding of how people adjust their beliefs based on scientific evidence and provide practical implications for science communication.

Keywords: belief updating, science communication, metascience, advice taking, statistical modeling

Presentation type: Oral presentation / Talk

Session: Advice taking and beyond: Judgment formation via advice taking, sequential collaboration, and belief updating

Spatiotemporal biases in manual interception

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Human processing of space and time is by far not unbiased but instead prone to errors. For example, spatial features (e.g., distance between two objects) can bias time processing (e.g., duration judgements) and potentially vice versa (e.g., kappa and tau effects). In a series of experiments, we i) tested whether such effects transfer to an action task (i.e., interception) and ii) aimed to address the role of sensory input. We repeatedly presented either a white dot or a sinusoidal tone, moving from left to right with each presentation, thereby forming spatial and temporal intervals between presentations. Participants were asked to predict and intercept the next presentation location and time. We found that increasing the time between sound presentations shifted participants interception location in movement direction. This indicates an effect from time on space for the auditory modality. For the visual presentation, results were mixed. Depending on factors like presentation duration, the number of repetitions and the combination of spatial and temporal intervals, either no effects, or a reversed effect from time on space (i.e., interception location shifted backwards with increasing time) together with an expected effect of space on time (delayed interception for increasing spatial intervals) were found. This variability in effects might be explained by differences in the precision of spatial and temporal representations. The results are interpreted in relation to the representational noise account and compared with similar biases like the Representational-Momentum or Fröhlich Effect.

Keywords: spatiotemporal bias, interception, kappa, tau

Presentation type: Oral presentation / Talk

Session: Spatial changes over time: current developments in motion perception

The Impact of Emotional Vocalizations on Body Ownership in Adolescent Patients with Dissociative Symptoms

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In past studies, the rubber hand illusion (RHI) was found to be intensified by emotions in healthy participants with greater subclinical manifestation of dissociative symptoms. As body detachment may occur as a consequence of emotional overregulation in arousing situations, we pose the question whether body plasticity, indicated by the RHI intensity, increases in patients with dissociation depending on the degree of emotional arousal. Based on these previous findings and the observation that dissociation is particularly pronounced in children and adolescents, the present study aims to examine differences in the RHI between young patients with high levels of dissociative symptoms and patients or healthy controls with low levels of dissociative symptoms during different emotional conditions. For this purpose, sad (low arousal), fearful (high arousal), and neutral vocalizations are played via headphones throughout six RHI trials (1 synchronous and 1 asynchronous stimulation trial per condition). In each trial, proprioceptive estimations of the real hand position, and a questionnaire on the subjective illusion intensity, a mood rating and a dissociative state questionnaire are completed. Prior to the RHI, a heartbeat detection task is conducted to measure interoceptive abilities, as we expect that interoceptive abilities moderate the effect of the emotional vocalizations on the RHI. According to a power analysis, 75 participants (25 patients with dissociation, 25 patients without dissociation, 25 healthy controls) between 12 and 21 years are required to achieve a power of 80%. By the time of the TEAP conference, data collection should be complete, and results will be presented.

Keywords: Rubber hand illusion, emotions, dissociative symptoms, interoception

Presentation type: Poster Presentation

Session: Health and environment

Using a (mostly) culture-fair paradigm to compare advice taking between cultures

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Most studies on advice taking use the judge-advisor system (JAS), in which one participant makes an initial judgment, then receives advice from another person, and subsequently makes a final judgment. Research using the JAS has shown that decision-makers egocentrically discount advice, that is, they overweight their own initial judgments. While advice taking has been studied in different countries, there is still a lack of cross-cultural comparisons. The main problem is that the judgment tasks used so far are not culture fair because they require general knowledge that may differ depending on where participants grew up. For example, European participants may find it easy to estimate distances between European cities but may have difficulties estimating the caloric content of Manti dumplings. Since task difficulty is a strong predictor of advice taking, differences in task difficulty due to different knowledge backgrounds produce a confound in cross-cultural comparisons. Here, we aimed to remedy this problem by developing a (largely) culture fair estimation task that only requires secondary school level mathematics knowledge. In this task, participants

estimate annual rainfall based on a certain number of measurements. They receive the estimate of a simulated colleague as advice along with information about the number of measurement available to that colleague. Using this task, we compared advice taking between German and Chinese university students. Our results show evidence of egocentric advice discounting in both groups, but the effect is more pronounced in the German sample.

Keywords: judgment and decision-making, advice taking, cross-cultural

Presentation type: Oral presentation / Talk

Session: Advice taking and beyond: Judgment formation via advice taking, sequential collaboration, and belief updating

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Neural Superstatistics: A Bayesian Method for Estimating Dynamic Models of Cognition

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Mathematical models of cognition are often memoryless and ignore potential fluctuations of their parameters. However, human cognition is inherently dynamic, regardless of the reference time scale. Thus, we propose to augment mechanistic cognitive models with a temporal dimension and estimate the resulting dynamics from a superstatistics perspective. In its simplest form, such a model entails a hierarchy between a low-level observation model and a high-level transition model. The observation model describes the local behavior of a system, and the transition model specifies how the parameters of the observation model evolve over time. To overcome the estimation challenges resulting from the complexity of superstatistical models, we develop and validate a simulation-based deep learning method for Bayesian inference, which can recover both time-varying and time-invariant parameters. We first benchmark our method against two existing frameworks capable of estimating time-varying parameters. We then apply our method to fit a dynamic version of the diffusion decision model to long time series of human response times data. Our results show that the deep learning approach is very efficient in capturing the temporal dynamics of the model. Furthermore, we show that the erroneous assumption of static or homogeneous parameters will hide important temporal information.

Keywords: Superstatistics, Dynamic Models, Bayesian Inference, Deep Learning, Cognitive Models

Presentation type: Oral presentation / Talk

Session: Advances in data analysis

How familiarity of the context shapes children's protest behavior following observed norm violations

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Numerous laboratory studies found that children show protest when a person does not adhere to a social norm. Whether the familiarity with the person and the environment affects protest behavior is still unknown, however. In the present study, two groups of N = 80 four-to-seven-year-old children (age-groups about equally distributed in each group) took part. Group A (unfamiliar) observed an unfamiliar experimenter in a laboratory setting, and Group B (familiar) observed one of their primary caregivers at home coloring a picture with "wrong" colors (e.g., using blue for an apple), thus demonstrating norm-violating behavior. Children's responses were categorized as "protest behavior" if they (a) showed normative protest, (b) reminded the other person to adhere the norm, or (c) expressed hints of protest (e.g. by questioning the behavior of the other person). Based on the number of corresponding behaviors, each child reached a protest score. Following the demonstration, children were offered to color their own picture while the other person left the room. Based on the number of objects colored the same as demonstrated, an imitation score was assessed. Protest scores were higher in the familiar compared to the unfamiliar condition. Children who showed any type of protest revealed less imitation when painting their own picture. No age-differences in protest behavior were observed.

Keywords: norm violation, protesting, norm enforcement, preschoolers

Presentation type: Poster Presentation

Session: Moral decisions and social interaction

Influence of recent motor history on hand and grasp posture selection

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Previous research has demonstrated that motor plans for sequential actions are reused and modified to reduce cognitive cost. The present study investigated if hand or grasp posture selection were more efficient when a previous motor plan could be reused. To this end, reaction time (RT) in a sequential knob-turning task was measured as a proxy for motor planning. We asked participants (n=26, mean age=24.8a, 14 males) to reach for a cylindrical knob and rotate an arrow on screen into a target zone. Initial orientation, final orientation, and hand color cue were varied to create all possible combinations of hand and grasp posture repetition. If motor plan reuse increased planning efficiency, a

decrease in RT was expected. A repeated measures (rm) ANOVA on RT showed a main effect of 'hand', $F(1,25) = 7.300$, $p = .012$, $\eta^2 = .009$, indicating that planning was more efficient for the dominant hand. More importantly, a second rmANOVA showed a main effect of 'hand repetition', $F(1,25) = 11.163$, $p = .003$, $\eta^2 = .006$, but no main effect of 'grasp repetition', $F(1,25) < 1$, $p = .672$, $\eta^2 < .001$. The findings suggest a planning advantage when the same hand is used for successive actions, as the previous motor plan can be recalled from working memory. The effect is independent of grasp posture. No such planning advantage is observed for grasp posture repetition, which is in potential contrast to findings from a series of experiments on posture hysteresis in sequential reaching tasks.

Keywords: motor planning, hand selection, grasp selection, hysteresis

Presentation type: Oral presentation / Talk

Session: Anticipation and prediction

Anatomical vs. external response coding in space-size associations in a reaching task

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The spatial-size association of response code (SSARC) effect refers to the finding that (right-handed) participants respond faster and more accurate with the left hand to a small stimulus and with the right hand to a large stimulus. In the present study, we examined whether the crucial spatial response code refers to the anatomical side of the effector (i.e., left and right hand) or to the external spatial response position (i.e., where the hands are positioned in space). In separate blocks, participants performed planar reaching movements either with their left hand to small and with their right hand to large stimuli or with their left hand to large and with their right hand to small stimuli. To dissociate anatomical and external response coding, participants performed the reaches with their arms held in parallel or crossed. Regardless of arm posture, right-handed participants responded faster with their left hand to small stimuli and with their right hand to large stimuli. Left-handed participants exhibited the reversed pattern: faster responses with their left hand to large stimuli and with their right hand to small stimuli. Together, these results indicate the dominance of hand-related (anatomical) coding, rather than position-related (external) response coding in the SSARC effect.

Keywords: SR-compatibility, Reference frames, Physical stimulus size, Reaching, Response location

Presentation type: Oral presentation / Talk

Session: Cross-dimensional compatibility effects between quantities, valence and space: Points of convergence and points of divergence

Path integration in healthy older adults and population with subjective cognitive decline

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Path integration deficits are apparent in healthy older adults and Alzheimer's disease (AD) patients. Yet, it remains unclear which specific aspects of the path integration process are most affected and whether these processes are differentially affected in older adults and those with AD. Here, we used immersive virtual reality to characterise path integration deficits in healthy older adults and those with subjective cognitive decline (SCD). During the task participants had access to multisensory self-motion cues (visual, vestibular and proprioceptive) as they were immersed in an open-field virtual environment and guided along short, curved paths. At certain points participants were asked to stop and indicate their initial heading orientation and start location. Overall, we found impaired path integration performance in the SCD group. These differences were not explained by general cognitive status, visuospatial working memory, subjective spatial abilities as well as balance. To further characterise the sources of the observed errors we used a computational model that allows us to decompose different parameters that contribute to the observed path and angular integration errors. Preliminary analysis suggests that memory leak, and randomly accumulating noise (across distance) is larger in the SCD group. Accumulating noise was also a key parameter in predicting path integration error in both groups, however, its contribution was larger in healthy older adults. These results will be discussed with reference to different mechanisms contributing to path integration deficits in healthy older adults and those with SCD.

Keywords: Navigation, Aging, Alzheimer Disease, Spatial cognition

Presentation type: Oral presentation / Talk

Session: Spatial Navigation

Processing of Negative Numbers and its Impact on Economic Judgement

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The perception and integration of numeric information is a prerequisite for many decisions in our daily life, such as when assessing risks. Research in numeric cognition indicates, that positive numbers are mentally represented on a compressed mental number line (CMNL), i.e., the same difference between two numerosities is perceived as smaller for greater numerosities than for smaller ones (e.g., Izard & Dehaene, 2008). The CMNL predicts an underestimation of the mean for sequences of positive numbers.

This suggests that for a risky lottery, a subjective certainty equivalent below the expected value may not only be due to preferences, such as risk aversion, but also due to perceptual biases in the mental representation of numbers (Khaw et al., 2021; Olschewski et al., 2021). We tested whether the assumption of a CMNL also applies to negative numbers and thus partially explains risk-seeking behavior in the loss domain. Using a fixed-sampling paradigm, participants sequentially sampled 20 numbers drawn from an underlying distribution and estimated the sequence's mean. The sequences either contained only positive numbers, only negative numbers, or both (i.e. mixed sequences) and varied in mean and standard deviation. In line with a CMNL for absolute magnitudes, we found an underestimation for positive and an overestimation for negative sequences, indicating that both, risk seeking and risk aversion could partly be explained by biases in number perception. However, the pattern reversed for mixed sequences. We discuss the impact on economic judgments when both, gains and losses are involved.

Keywords: decision-making, Decision-from-Experience, number perception, risk preferences

Presentation type: Oral presentation / Talk

Session: How agents' cognitive processes shape self-determined information search and the resulting judgements and decisions

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Does the modality matter? Binding response sequences while responding to shapes or tones

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In everyday life, interacting with our environment encompasses responding to stimuli of different sensory modalities. Current action control theories propose that simple actions like responding to a stimulus lead to the binding of stimulus and response features into a common representation. Repetition of any of these features retrieves the other bound features, thus influencing further responding. Furthermore, this principle of binding and retrieval also applies to actions of higher complexity, as also features of multiple responses can be bound to each other and thus retrieve each other, so-called response-response bindings (Moeller & Frings, 2019). Previous research has shown that bindings can not only occur responding to visual stimuli but also between auditory stimuli and responses. So far, the research on response-response bindings used visual stimuli. With previous findings in mind, this study tested whether response-response binding also occurs when responding to auditory stimuli and compared results from the visual and auditory domains. Indeed, results show that binding between responses occurs when responding to auditory stimuli, underlining that also binding in more complex actions is not limited to the visual domain. Findings serve as a basis to further investigate complex actions separated from influences of vision.

Keywords: binding, retrieval, action control

Presentation type: Oral presentation / Talk

Session: Recent advances in binding and retrieval in action control I: Learning, task switching, music, and neural correlates

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Neural signature and symptom correlations of model-free and model-based decision making in OCD

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Decision-making in humans is considered to be based on two parallel systems of habitual model-free (MF) learning and goal-directed model-based (MB) learning. Healthy individuals show parallel engagement of both systems, whereas obsessive-compulsive disorder (OCD) patients appear to be biased towards a MF pattern. This tendency may promote obsessive and compulsive decision behaviours relating to clinical symptoms. Computational modelling of decision-making has been integrated into the analysis of neural data to explain dysfunctional underlying mechanisms. The neural signatures of these processes are still unclear in OCD. Here, we combined computational modelling with fMRI to investigate the underlying mechanisms of potentially altered decision-making patterns in 22 OCD patients compared to 22 controls. Using hierarchical Bayesian modelling in the two-step Markov decision task, we explored MB and MF decision-making behaviours based on four model parameters: model-weights representing MF vs. MB decisions, learning-rate, choice-randomness and perseverance. Patients demonstrated higher choice-randomness than controls. While the behavioural results suggested a MF decision-making behaviour in both groups, model-weights indicated that controls chose a more MF approach, and patients chose a mixed approach. In OCD, anterior cingulate cortex was associated with MB, and nucleus accumbens with MF decisions. Furthermore, we found that elevated activation in the orbito-frontal cortex was linked with lower learning-rate in OCD. To our knowledge, this is the first fMRI study exploring decision-making in OCD with this task using computational modelling. Our results show great potential for this approach to identify underlying neural mechanisms of OCD, and hence, aid in developing targeted treatments and interventions.

Keywords: OCD, decision-making, model-free, model-based, computational modelling, fMRI, computational psychiatry

Presentation type: Oral presentation / Talk

Session: Computational psychiatry: Identifying the fine-grained behavioural mechanisms underlying symptoms in psychosis and internalising disorders

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A Neuro-VR approach to investigating driving behaviour at intersections

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Intersections are potential hotspots for crashes, oftentimes caused by human error. Hence, it is important to understand the cognitive processes underlying driving behaviour at intersection. Here, we developed a driving simulation in virtual reality (VR) where participants drove through a series of intersection in order to reach a target destination. We systematically varied the amount of traffic, right of way (vs. give way), and the presence of a pedestrian running across the street. The VR scenario allowed us to record a variety of behavioural data, such as velocity, acceleration/braking patterns and lane position. We further recorded electroencephalogram (EEG) while participants were driving in the VR scenario. This Neuro-VR approach allowed us to investigate the neural correlates of realistic driving while maintaining full experimental control. In our final sample of 20 younger adults, we analysed patterns of driving behaviour in separate time segments leading up to the intersection. Our results showed that participants reduced their speed early when giving way (vs. right of way) and reduced their speed later when approaching an intersection with traffic (vs. no traffic). When giving way, participants were slower to activate their indicator (vs. when having right of way). We further analysed theta power, an EEG marker of attentional control. Preliminary results showed an early increase in theta power when approaching an intersection with traffic, potentially indicating a preparatory enhancement of control. Finally, we discuss the advantages and potential pitfalls of Neuro-VR in driving research.

Keywords: driving behaviour, virtual reality, theta power

Presentation type: Oral presentation / Talk

Session: Topics of Traffic Psychology

Learning dependencies in a sequence of decision-making tasks

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When people make decisions, these often do not stand alone but are integrated into a sequence of decisions. For instance, a doctor will first decide on a patient's treatment and then about the duration of the treatment. In such decision sequences, later decisions frequently depend on the outcome of the first decision. That humans can learn dependencies between sequentially presented information has been shown in grammar learning. However, there is little research on the role of sequential dependencies in more complex tasks such as category learning or judgment. Here, we investigate whether people are able to pick up dependencies between the outcomes of two categorization tasks and use them to speed up learning and categorize novel items. In

the experiment, we varied whether a contingency between the outcome of two categorization tasks existed and whether the two tasks were adjacent (the tasks followed each other) or non-adjacent (an estimation task took place between them). In the adjacent condition, participants learned to categorize the objects of the second task better than in the control and the non-adjacent condition. But, during transfer participants used the dependency to categorize novel objects in the adjacent and the non-adjacent condition. These results are consistent with grammar learning experiments, indicating that humans can pick up dependencies and learn adjacent dependencies more easily than non-adjacent dependencies. The results also show the importance of taking temporal regularities between decision tasks into account.

Keywords: Decision-Making, Dependency Learning, Statistical Learning, Category Learning

Presentation type: Oral presentation / Talk

Session: Decision making

Grain size effects in retrieval practice

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Testing can enhance memory, but what is the optimal placement of tests during a learning episode? The grain size hypothesis proposes that several interim tests of smaller amounts of information interspersed throughout learning should result in better retention than a single test at the end of learning, as retrieval success during practice is expected to be higher. We evaluated the grain size hypothesis using lists of related and unrelated words and via a meta-analysis. While past research has failed to document support for the hypothesis, both our experiments and meta-analysis confirm that repeated interim tests enhance long-term recall compared to a single practice test. The results also demonstrate very substantial forgetting from interim practice tests to final recall.

Keywords: memory, testing effect, learning, retrieval

Presentation type: Oral presentation / Talk

Session: Benefits of Practice Tests on Learning

Geofencing method in behavioral research: How and where can it be used?

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University of Konstanz

We present the novel geofencing method in behavioral research, along with its implementation in our free and open-source software Samply for experience sampling research. Geofencing, built on geolocation technology, forms a virtual fence around specific geo-locations. Each time a participant crosses the virtual boundary around the fenced area, an event can be triggered on a smartphone, for example, the participant can be prompted to complete a survey. Geofencing can reduce the problems of continuous location tracking, such as recording sensitive geolocation data and battery depletion. In the scenarios where participants choose their own locations for geofencing (e.g., at home or at work), there is no need to transmit location data to the researcher, so this method can ensure privacy and anonymity. Given the widespread use of smartphones and mobile Internet, geofencing has become a feasible tool for studying human behavior and experience outside the laboratory. The method can advance basic and applied psychological science to a new frontier of contextual research. So far, however, there is a lack of guidance on how and when to use geofencing in research. We describe the current challenges and implementations of geofencing and present three empirical studies in which we evaluated geofencing using Samply. The studies showed that the accuracy and precision of geofencing depend on the type of event, location radius, environment, and operating system. We present potential implications and recommendations for behavioral research.

Keywords: geofencing, experience sampling method, ambulatory assessment, methodology

Presentation type: Oral presentation / Talk

Session: Conducting and implementing experiments

Is the temporal binding effect in the Libet-Clock task based in spatial working memory?

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Intentional or temporal binding as a proposed measure of the sense of agency is subject to ongoing research and debate. Current research revolves mainly around factors increasing or reducing binding while empirical findings and theories regarding its underlying cognitive and neural mechanisms lag behind. In this study we test the theory that temporal binding in the Libet-Clock task is based on spatial working memory processes. The idea stems from anecdotal reports of participants in prior studies using the Libet-Clock to measure binding. They mentioned that the clock hand position during the action (button press) is difficult to ignore when asked to judge the clock hand position during the outcome (a tone). The Libet-Clock task is bascially a visuo-spatial (working) memory task in which clock hand positions marked by events must be remembered. Therefore, two cognitive processes corresponding to this reported problem to inhibit an irrelevant clock hand position may be proactive and retroactive interference within the spatial working memory rather than a change in time perception. To test this assumption, at least 30 participants (exact sample size determined by Bayes factors) will perform the Libet-Clock task and a similar task in which the displayed positions

during the action and outcome are not correlated with time. If the assumption is true binding should occur in both tasks. Additionally, we will use a visuospatial n-back task to measure spatial working memory performance which should correlated negatively with the binding in both binding tasks. Data will be collected in time for the conference.

Keywords: Intentional Binding, temporal binding, working memory, spatial working memory

Presentation type: Poster Presentation

Session: Memory and working memory

Online Competition among Multiple Word-Object-Mappings in Cross-Situational Statistical Learning

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Cross-Situational Statistical Learning (CSSL) is an example of statistical learning where learners gradually learn word-object-associations based on the co-occurrence of word and referent. In this paradigm, participants are exposed to multiple situations where a word and a referent always co-occur while competitors vary (Yu & Smith, 2007). Even as every situation by itself is ambiguous, the correct mappings can be extracted by combining information across time. For some theories, during this process, multiple word-object-mappings are acquired and compete during the acquisition (McMurray et al., 2012). Currently, it is not well-understood how CSSL is affected by multiple simultaneously acquired overlapping mappings. Thus, we will investigate online competition between referents via eye-tracking during CSSL. Participants will acquire 1:1 (one word to one object) and 1:2 (one word to two objects, interlingual homographs) mappings in Experiment 1. We will track their eye movements, and we will analyse them using a four points logistic. This will allow us to estimate how competition impacts specific timing components of referent activation. We predict that 1:2 mappings will require more competition; therefore, looks to their targets will have a delayed fixation and a shallower slope. In Experiment 2, participants will acquire only 1:2 mappings. The experiment aims to examine the competition between the two existing meanings. If participants maintain multiple mappings, they will look to the second referent more than at baseline. We also predict that online competition will progressively increase.

Keywords: Eye-tracking, statistical learning, cross-situational statistical learning, language acquisition

Presentation type: No-Data Poster

Session:

Is Evaluative Conditioning Effector Specific?

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Evaluative Conditioning (EC) refers to changes in the liking of a stimulus due to its association with other positive or negative stimuli. While traditional accounts of EC focus on stimulus associations as the mechanism, newer accounts based on action control theories, have shown associations between stimuli and responses as a mechanism of EC. According to action control theories, stimulus and response features are integrated, or bound, together in episodic traces (e.g., event files or instances). This integration can result, for instance, in the transfer of the valence of a response to a neutral stimulus, thus leading to EC effects. However, to date, most studies have implemented hand responses in EC research. Action control theories indicate that response features are associated with stimulus features regardless of the specific effector. However, among other differences, most of our interactions with objects are with our hands, and thus, one possibility is that hand responses may be more likely to naturally reflect preferences or valence learning than foot responses. In order to test this question, the present study implemented a design similar to Blask et al., (2016) but with feet as effectors. Participants learned to associate responses with a specific valence, after which they responded to conditioned stimuli (CS). In order to test the valence transfer, participants underwent a compatibility task and in order to test for EC effects participants expressed their preference for the CS on rating scale. Results are discussed against the background of action control theories and evaluative conditioning literature.

Keywords: evaluative conditioning, action control, stimulus-response binding

Presentation type: Poster Presentation

Session: Emotion cognition

Visuo-spatial processes in number line estimation – Evidence from Neglect

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Number line estimation (i.e., indicating the spatial position on a number line from which only start and endpoint are given) has been argued to measure the spatial representation of number magnitude aka the mental number line. However, recent evidence suggested that it draws heavily on visuo-spatial processes. In the present study, we evaluated influences of the latter on number line estimation by considering a

sample of patients with neglect, a pathology which is known to specifically impair spatial processing. Therefore, we administered different tasks involving horizontal lines to neglect patients that showed a line bisection bias (NLB+) and compared their performance to i) neglect patients not showing a line bisection bias, ii) patients with right hemisphere damage without neglect, and iii) healthy controls. In a first task, participants had to segment a line into three or four equal parts. Results indicated that patients with a line bisection bias overestimated the size of lefthand segments. However, when lines were introduced as number lines (ranging from 0 to 10, requiring estimation of numbers 1, 4, 5, 6, and 9) NLB+ patients showed rightward overestimation for the numbers 4 and 5 compared to healthy controls. Additionally, all patient groups tended to place number 1 too far to the left and number 9 too far to the right, suggesting a bias towards endpoints. Our results support the notion that number line estimation draws on visuo-spatial processes (typically in terms of proportional reasoning) rather than reflecting a measure of the spatial representation of number magnitude.

Keywords: Spatial-numerical association, Number Line Estimation, Line Bisection, visuospatial neglect

Presentation type: Oral presentation / Talk

Session: How spatial are numbers?

A Validity-based Method for Conducting Interdependent Experiments

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The experiment is the method for testing causal relationships between psychological constructs. While method books extensively discuss techniques that allow for a causal interpretation, they typically do not explicitly discuss how to plan a set of studies that maximizes our understanding of a causal relation. When designing experiments, researchers must make compromises between conflicting aspects. This might, for example, mean optimizing the design for internal or external validity. Each compromise imposes limitations on the explanations a study provides. Typically, authors list those limitations in the discussion section, leaving it up to follow-up studies to expand on the findings. When enough studies are conducted, eventually, a meta-analysis can be conducted to sum up the state of the literature. This practice is largely unsystematic. Instead, studies can be conducted in interconnected batches, using studies specifically to address the limitations of its predecessor. Deliberately designing multiple investigations for the same phenomenon opens the possibility of changing the experimental manipulations' operationalizations and testing different moderators and mediators of a causal relation. This systematic approach allows researchers to paint a more comprehensive picture of a phenomenon instead of only contributing pieces here or there. In such a validity-based framework of interdependent studies, researchers plan studies that systematically test aspects of statistical, internal, external, or construct

validity. In a review of articles from *Journal of Personality and Social Psychology*, we explore to what extent researchers already use such a validity-based framework.

Keywords: Methods; Validity; Meta-Science

Presentation type: Oral presentation / Talk

Session: Conducting and implementing experiments

Spatial distortions in persistent and temporary tactile landmarks

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Landmarks influence spatial perception in multiple ways. For example, localizations of targets show less variability near landmarks, and spatial distortions towards the landmarks, the landmark attraction effect, have been reported. Crucially, most studies used shortly presented landmarks which stands in contrast with our everyday experiences where we are more used to persistent landmarks (e.g., environmental landmarks such as buildings or anatomical landmarks such as joints). We turn to the tactile modality, which allows us to compare artificially applied, short-term landmarks (locally applied tactile stimulation) with environmental, persistent landmarks (elbow and wrist). With a tactile experimental set-up, we presented artificial landmarks on the skin along the left forearm and across three experiments (each N = 24), systematically manipulated the location of the artificial landmark to differentiate between the effects of artificial and environmental landmarks. Whereas artificial landmarks produced a pattern of landmark attraction when the influence of environmentallandmarks was minimized, we did not find an additive landmark attraction effect when artificial and environmentallandmarks were presented in close proximity. Rather, a landmark repulsion was observed in this case, which raises questions about the transferability of results with shortly presented, artificial landmarks in the laboratory to more natural settings with persistent landmarks.

Keywords: Landmark attraction, tactile localization, spatial distortions

Presentation type: Oral presentation / Talk

Session: Spatial and temporal perception

Disgust-Associated Neutral Stimuli Have an Advantage in Memory Despite Attentional Avoidance

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Disgust is a basic emotion that provides pathogen avoidance. Because pathogens are invisible, it is crucial to remember the objects containing pathogens to avoid them. Accordingly, research have shown that disgusting stimuli are enhanced in memory. However, it is important to evaluate this memory effect by considering the disgust-specific properties. Firstly, disgust has a contagious nature, and disgust-associated neutral stimuli can also be expected to have a memory advantage. Secondly, while previous studies explained memory advantage for disgust with automatic attentional capture, several studies have demonstrated that disgust causes attentional avoidance. In the present study, two experiments were conducted using the categorical conditioning paradigm in which objects from two different categories were associated with disgusting (US+) or neutral pictures (US-). That is, images from one category (CS+) were followed by disgust-related pictures while the others (CS-) were followed by neutral pictures. In Experiment 1, episodic memory performance was tested by giving participants a recognition test either immediately after the learning phase or 24-h later. ROC analysis showed that there were no accuracy or bias differences between CS+ and CS- stimuli on the immediate test, but CS+ stimuli had a memory advantage on the delayed test. In Experiment 2, participants' eye movements were recorded during categorical conditioning to evaluate the attentional processes during the learning/encoding phase. Results showed that disgust caused attentional avoidance, not attentional capture, for both disgust-associated neutral stimuli and inherently disgusting stimuli. To conclude, this study demonstrated that disgust-associated neutral stimuli acquired a memory advantage despite attentional avoidance.

Keywords: Disgust, neutral stimuli, episodic memory, attentional avoidance

Presentation type: Oral presentation / Talk

Session: Implicit testing

Validating the Vienna Art Interest Art Knowledge (VAIAK) Questionnaire

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In this poster I will present the cumulative work (Specker et al., 2018; Specker, 2021, Specker et al., under review) done to develop and validate the Vienna Art Interest Art Knowledge (VAIAK) Questionnaire. The questionnaire was developed to address two problems in the field: a lack of conceptual clarity of what art expertise is, and a lack of coherent measurement for assessing expertise. The VAIAK addresses this by focusing on the measurement of two commonly studied sub-domains of expertise: art interest and art knowledge. It consists of two separate scales, one that measures art interest (11 items) and one that measures art knowledge (6 multiple-choice and 20 open answer items, 26 items in total).In the paper I will present evidence that supports the psychometric model of the VAIAK (by way of CFA), present validation evidence in terms of concurrent and discriminant validity, internal structure (reliability), discrimination ability (between experts & non experts), configural measurement invariance, test-retest

reliability, and most recently an item-focused perspective using IRT as well as qualitative analyses. This research has increased insight into the workings of the scale and led to a modified version the VAIAK-R. Beyond specifically discussing the VAIAK, I aim to show more generally how continuous validation efforts of any scale could look like and what theoretical as well as methodological insight such research efforts can provide by using the VAIAK as a case study.

Keywords: art interest,art knowledge, scale development, validation, measurement, item-response theory, empirical aesthetics

Presentation type: Poster Presentation

Session: Moral decisions and social interaction

Strategic information search in decisions from experience

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Good decisions require information. When people face a novel situation in which they make a choice but know little about the options in advance, how do they search for information? We present an analysis of over 1,000,000 information-search decisions made by over 2,500 individuals in a decisions-from-experience setting. We found that individuals solve the problem in a smart way using a toolbox of at least three strategies. In some cases, they decide how much information they want to obtain in advance and stick to that decision, irrespective of the obtained feedback. In others, they leverage sophisticated knowledge about the structure of the environment to find previously unobserved outcomes. Only after having done so do they try to reduce statistical uncertainty as proposed by existing accounts of information search. Our results highlight the need for broader theories of information-search behavior in decisions under uncertainty capturing the diversity of people's strategic toolbox.

Keywords: Information search, risky choice, strategic behavior, ecological rationality

Presentation type: Oral presentation / Talk

Session: Strategic information search in inferences and decisions under uncertainty

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The pitfalls of slow motion replay - on the overestimation of actors' available time and intention

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Slow motion replays are a common video evidence tool in sports or in the legal system which offer the opportunity to (re-)evaluate critical situations. However, current studies have shown that slow motion replays cannot only enhance precision and decision-making by offering a more detailed view but might come with several biases. Specifically, research has revealed that actions (such as foul plays or crime actions) which are replayed in slow motion are perceived to take longer and rated to be more intentional (often also influencing the severity of related sanctions). We recently observed that rather than overestimating the original duration per se, participants apparently fail to recognize the degree a video was slowed down (leading to an erroneous backward calculation into real time). In fact, we detected that providing explicit video speed information can eliminate the time overestimation bias. In a second step, we now scrutinized if not only the time overestimation, but also the overestimation of intentionality can be reduced by this explicit additional information. To this end, a series of experiments was conducted in which participants watched videos of different sport fouls and were asked to evaluate original duration, intentionality and time the foul players had at disposition to plan their actions. Results revealed the hypothesized overestimations (reflected by increased ratings for slow motion videos) and that explicit video speed information could reduce these biases to different extents. Potential mechanisms underlying these cognitive-evaluative biases of time and intentionality as well as practical implications and open questions will be discussed.

Keywords: slow motion, video speed, subjective time, time perception, intentionality

Presentation type: Oral presentation / Talk

Session: Spatial and temporal perception

Visual short-term memory and neuropsychological test results in patients with amnestic mild cognitive impairment

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Patients with amnestic Mild Cognitive Impairment (aMCI) are at increased risk for further cognitive decline and development of Alzheimer's dementia. Recent studies using psychophysical paradigms of whole report based on the theory of visual attention (TVA; Bundesen, 1990) suggest that, in addition to episodic longterm memory deficits, aMCI patients also show a reduced visual short-term memory (VSTM) capacity. That is, the maximum number of elements they can represented in VSTM in a given instant is reduced compared to healthy older adults. The present study aims to evaluate whether and which of the early neurocognitive symptoms shown by patients with aMCI in the established neuropsychological CERAD+ (Consortium to Establish a Registry for Alzheimer's Disease) can be explained by such VSTM capacity reduction. Patients with aMCI diagnosis were recruited at the Jena University Hospital Memory Center. They

underwent a TVA-based whole report assessment delivering quantitative estimates of VSTM capacity. Partial correlation and regression analyses revealed that VSTM capacity is related to and can predict neuropsychological symptoms in aMCI patients.

Keywords: Visual Short-Term Memory Capacity, Visual Attention, aMCI, Neuro-cognitive biomarkers, Theory of Visual Attention, Neuropsychology, Computational Modelling

Presentation type: Oral presentation / Talk

Session: Advances in TVA-based visual attention research II: Basic and Applied

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Subjektives Wissen im Kontext der Wahrnehmung und Akzeptanz autonomer Fahrzeuge

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Die Technologie von autonomen Fahrzeugen entwickelt sich schnell und erhält in der Gesellschaft eine immer größer werdende Aufmerksamkeit. Den zahlreichen Vorteilen steht jedoch eine mangelnde Akzeptanz gegenüber. Daraus ergibt sich die Notwendigkeit, einflussnehmende Faktoren auf die Akzeptanz gegenüber autonomen Fahrzeugen in den Fokus der Forschung zu rücken. Ziel der vorliegenden Studie war daher die Untersuchung der Auswirkungen des subjektiven Wissens auf die Wahrnehmung und Akzeptanz autonomer Fahrzeuge. Innerhalb einer Online-Studie erhielten N = 435 Teilnehmende (M = 28.59; SD = 10.04 Jahre; 291 weiblich) ein vierminütiges Erklärvideo zum autonomen Fahren. Vor und nach dem Video wurde das subjektive Wissen abgefragt sowie anschließend weitere Akzeptanzkonstrukte untersucht. Innerhalb einer Strukturgleichungsanalyse zeigte sich, dass das subjektive Wissen die Wahrnehmung (wahrgenommenes Risiko und wahrgenommene Bedienbarkeit) direkt beeinflusst. Darüber hinaus konnten indirekte Effekte über die Wahrnehmungsfaktoren auf die Akzeptanz festgestellt werden. Weiterhin wiesen Teilnehmende im Anschluss an das Erklärvideo ein höheres subjektives Wissen auf als zuvor, wobei Teilnehmende mit einem zuvor unterdurchschnittlichen Wissen einen höheren Wissenszuwachs angegeben haben als Teilnehmende mit einem überdurchschnittlichen subjektiven Wissen. Die Ergebnisse zeigen, dass das subjektive Wissen eine Determinante zur Verbesserung der Wahrnehmung und der folgenden Akzeptanz darstellt. Dabei sollten Personen frühzeitig über autonome Fahrzeuge informiert werden, bevor sich falsche Vorstellungen und Erwartungen verfestigen. Die vorliegenden Ergebnisse bilden eine Grundlage in dem Bereich subjektives Wissen und automatisierte Technologien, auf der zukünftige Studien, beispielsweise im Hinblick auf die Risikowahrnehmung sowie die Ängste gegenüber automatisierten Technologien, aufbauen sollten.

Keywords: autonomes Fahren, subjektives Wissen, Technologieakzeptanz

Presentation type: Oral presentation / Talk

Session: Technology acceptance and risk assessment

Is the automated driving system “aware” of the pedestrian? Results from two driving simulators

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In urban areas, drivers often have difficulty detecting pedestrians who want to cross the road but are obstructed by parked vehicles. Highly automated vehicles (HAVs, SAE Level 4) need to solve this problem independently and at least as safely as human drivers. We conducted two experimental studies, a stationary driving simulator study and a human&vehicle-in-the-loop study, to investigate whether passenger trust in automation can be increased and perceived risk in the driving situation can be mitigated by adjusting the driving behaviour of the HAV. We varied the lateral offset to the centre of the lane (left, right, none) and deceleration (only in the driving simulator study) when passing a parked vehicle on an urban main road (speed limit set at 50 km/h) to convey to the passenger that the vehicle is “aware” of a potential hazard caused by the presence of the parked vehicle and the pedestrian hidden by the parked vehicle. The results support the idea that it is beneficial for human passengers to be informed of the HAV's “awareness”. While the deceleration somewhat enhanced passengers’ trust, the introduction of a lateral offset did not have a substantially positive effect on passengers' perceived risk or trust. Future research should compare the effects of behavioural adjustments with other approaches, such as in-vehicle visual warnings and information systems.

Keywords: Traffic psychology, automated driving, passenger, urban area

Presentation type: Oral presentation / Talk

Session: Automation while driving – current problems and approaches

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Cognitive Control and Multitasking: A novel method for manipulating the stability-flexibility-dilemma

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The stability-flexibility-dilemma describes antagonistic demands of cognitive control to process information and conduct goal-directed behaviour during multitasking. While a flexible control mode facilitates task-switching and goal-updating, a stable control mode is associated with goal-shielding and reduced task interference. However, each control

mode is also related to disadvantages: cognitive flexibility is prone to distraction whereas cognitive stability is associated with reduced background monitoring. Up to now the stability-flexibility-dilemma of cognitive control has not been investigated beyond the context of simple stimulus-response experiments. Therefore, a novel method is presented that aims to induce a stable or flexible control mode in an application-oriented multitasking environment. In the present experiment, the Multi-Attribute Task Battery (MATB) serves as the experimental task. The MATB simulates four separate flight tasks that must be operated concurrently. The control mode of the participants was shifted between a stable or flexible direction based on a gamification method. In the stable condition, participants were told to prioritize a main task (i.e. the tracking task). In the flexible condition, participants had to perform the tasks without prioritisation. Based on the distribution of fixations a feedback score was calculated: in the stable condition, visual fixations towards the tracking task were rewarded; in the flexible condition, equally distributed fixations towards all tasks. Results indicate differences in performance, workload and different eye-tracking metrics in accordance with the induced control modes. Thus, the presented method offers a novel experimental framework for examining the stability-flexibility-dilemma in various multitasking contexts.

Keywords: Task Switching, Workload, MATB, Eye-tracking, Gamification

Presentation type: Oral presentation / Talk

Session: Cognitive control

The properties of imaginary scenes are represented in cortical alpha activity

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During our daily lives we regularly imagine natural scenes, whether we are reading our favorite novel or trying to spatially navigate through the environment. Previous EEG/MEG research has suggested that cortical alpha activity plays a critical role in mediating visual imagery. However, our current understanding of what information is encoded in imagery-related alpha activity is still limited. To investigate this further, we conducted a study in which we aimed to decode the properties of imagined scenes from rhythmic cortical activity patterns, hypothesizing that these properties would be represented in the alpha activity. Participants were presented detailed three-sentence descriptions of individual scenes which varied in four properties: spatial expanse, naturalness, clutter level and luminance. Participants were instructed to read the description and, following a visual cue, vividly imagine the scene. Meanwhile their neural activity was recorded with EEG. Using multivariate decoding analyses on EEG power patterns at specific neural frequencies, we found that all four investigated scene properties were discriminable exclusively in the alpha frequency range. Cross-decoding between the imagery data and data from an additional perception task, in which

participants viewed images that matched the scene descriptions, indicated that scene representations in the alpha band are shared between imagery and late perception. Our results show that the properties of imagined scenes are represented in cortical activity in the alpha range, suggesting that alpha activity mediates the top-down activation of scene-related perceptual contents during visual imagery.

Keywords: imagery, scenes, EEG, alpha activity, decoding

Presentation type: Poster Presentation

Session: Scene perception

Multitasking-Tasks Predict Naturalistic Multitasking Better than Multitasking Costs: Evidence from a Laboratory-Field Study

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The dual-task paradigm represents an established laboratory approach to investigate multitasking. Hereby, performance differences as a result of executing (at least) two tasks simultaneously relative to each single task are considered to indicate multitasking abilities. However, this method has been criticized for its weak ecological validity as it hardly operationalizes everyday multitasking. A solution for this may be to combine several subtasks such that together they represent a more naturalistic multitasking scenario. The Multi-Attribute Task Battery (MATB) simulates such a scenario requiring individuals to steer a joystick, to respond to radio calls and emergency lights, and to manage the fuel tank of an aircraft. But it has not yet been established whether a multitasking scenario, such as the MATB, indeed predicts naturalistic multitasking performance better than the dual-task paradigm approach. We addressed this issue by investigating whether naturalistic multitasking performance of 25 volunteers from the Universität der Bundeswehr München was better predicted by MATB performance than laboratory multitasking. Laboratory multitasking was operationalized by means of performance decrements in solving math equations and responding to radio signals in dual- relative to single-task conditions. Naturalistic multitasking was operationalized by means of decrements in shooting performance in triple- and dual- relative to single-task conditions. Bayesian regression analyses indicated at least moderate evidence in favour of correlations between MATB performance and laboratory and naturalistic multitasking, but not between the latter. Thus, our data suggest that a multitasking scenario, such as the MATB, might be more applicable to predict naturalistic multitasking performance than dual/multi-task decrements.

Keywords: executive control, workload, ecological validity, military performance

Presentation type: Oral presentation / Talk

Session: Cognitive control

Minimal Effort, Maximal Results - How Long do Relaxation Exercises Need to be?

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It has been known for several centuries that relaxation and relaxation exercises do not only counteract the negative effects of stress, pain, and other neuropsychological disorders, but are also beneficial on their own and can ameliorate performance. However, one important open question still remains: How long does a relaxation exercise have to be in order to produce significant effects on subjective and objective measures of relaxation? To address this issue, we are planning a series of experiments using the well-known relaxation technique Progressive Muscle Relaxation (PMR). In the experiments, participants will be randomly assigned to different PMR durations (ranging from only 1 minute to 30 minutes). Subjective relaxation will be measured with the Relaxation State Questionnaire (RSQ). For objective relaxation, three different measures will be used: Pulse, blood pressure, and baseline pupil diameter. Both the subjective and objective measurements will be collected before and after the relaxation exercise. Mixed ANOVAs will be performed to compute differences before vs. after the exercise and for the differences between the PMR durations. If effects can be found even after the short PMR exercise, this can be an important implication for future studies, giving first hints on how long relaxation exercises in experiments need to be in order to produce significant effects. Also, differences between the subjective feeling of relaxation and the objective measurements (or even between the three objective measurements) can be very insightful regarding the sensitivity of the different measurements to various PMR durations.

Keywords: relaxation, PMR

Presentation type: No-Data Poster

Session:

Gaussian noise on reading or listening materials increases mind wandering and impairs comprehension

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In many everyday situations, reading or listening tasks are difficult to process on a perceptual level as examples such as illegible handwriting or connection problems during video conferencing demonstrate. It is yet unclear whether the presence of such perceptual noise influences people’s capability to focus their attention on a current task.

Therefore, in the present study, we investigated whether perceptual noise imposed while reading or listening to a Sherlock Holmes story affects mind-wandering processes as well as text comprehension. We presented 175 participants with the story in either a visual or an auditory presentation format. For half of the participants in each presentation-format condition, the story was superimposed by (visual or auditory) Gaussian noise. All participants' thoughts and motivational states were probed from time to time during reading or listening. Independent of the presentation format, we found that the participants in the noise conditions reported higher mind-wandering levels and performed worse in a later comprehension test compared to the participants in the no-noise conditions. These negative effects of perceptual noise on on-task focus and comprehension were partly driven by motivational factors: The presence of noise decreased reading/listening motivation which, in turn, increased mind wandering. Our results are well in line with results from studies investigating the effects of increased semantic reading difficulty on mind-wandering, indicating that semantic and perceptual difficulty might elicit similar processes.

Keywords: mind wandering, task-unrelated thought, perceptual processing difficulty, text comprehension

Presentation type: Oral presentation / Talk

Session: Text comprehension

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crossmodal response precueing

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In the response precueing paradigm a cue indicates the subset of relevant responses and allows to prepare for those. Classic response precueing studies used visuo-spatial targets combined with manual responses. Hitherto, possible crossmodal influences were neglected. We developed a novel crossmodal response precueing paradigm combining visual and auditory bimodal precues with visual or auditory unimodal targets and tested it in two successive experiments (N= 66). An additional manipulation the cue target interval in one experiment confirmed that the cues were used for preparation. While our data hints towards an advantage for visual over auditory targets, it overall indicates a general advantage for auditory cues irrespective of target modality. This interaction might be caused by the higher alerting quality of auditory cues, requiring active attention to process visual targets as effectively. Interestingly, the established advantage of hand over finger cues diminish with our non-spatial cues. This may be due to the fact that the spatial features responsible for cue-pattern advantages did not overlap. However, this is an assumption needing further research.

Keywords: response precueing, crossmodal attention, crossmodal cues (cueing)

Presentation type: Oral presentation / Talk

Session: Basic attention

Action selection in early stages of psychosis: an active inference approach

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In psychosis, alterations in value-based action selection and action-outcome learning can be observed often even before disease onset. Computational models of decision-making allow the investigation of whether and how these impairments contribute mechanistically to psychotic symptoms and, thus, have great potential to improve early identification and intervention. The active inference (AI) framework conceptualizes decision-making as a process of Bayesian inference in which the brain predicts the consequences of an action based on both past experiences and the structure of the task to choose the action to produce the most preferred outcomes. Using AI modelling, we wanted to explore (1) whether AI parameters of a modelled orthogonalized Go/NoGo task differ between at-risk-mental-state (ARMS) individuals, first-episode psychosis patients (FEP) and healthy controls and (2) whether task performance and modelling parameters would be suitable for identifying group associations. We observed reduced performance in patients with specific deficits in punishment learning. In addition, AI-modelling showed that FEP patients displayed increased forgetting and less optimal general choice behavior, with poorer action-state association (1). Using ROC analysis, we were able to demonstrate that combining the specific expression of modelling parameters and the individual performances measures revealed fair-to-good classification performances of all groups which is especially relevant for the distinction of controls and ARMS individuals (2). Taken together, our findings show that AI-modelling of an orthogonalized Go/No-Go task does not only provide further explanation for dysfunctional mechanisms underlying decision-making in psychosis, but may also be highly relevant for future research on the development of diagnostic biomarkers.

Keywords: action selection, psychosis, computational modelling, active inference, classification, computational psychiatry

Presentation type: Oral presentation / Talk

Session: Computational psychiatry: Identifying the fine-grained behavioural mechanisms underlying symptoms in psychosis and internalising disorders

Self-Nudging for Accuracy to Reduce Misinformation Sharing Online

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Self-nudging is the concept that people can become their own choice architects to improve their decision environment in a way that aligns with their own goals and preferences. The online sphere is particularly suited to this approach because of its flexibility and because users' autonomy is often especially endangered in this environment. In this two-wave experimental study (N = 965) we presented participants with information about a behavioral intervention against the spread of misinformation and could subsequently decide for or against exposure to the nudge in the form of a prompting question. The investigated intervention is the accuracy nudge, which in form of a prompting question aims to shift attention towards accuracy in sharing decisions. The self-chosen implementation of the accuracy nudge increased the amount of accurate news sharing intentions relative to inaccurate news. The self-nudge increased sharing discernment by a factor of 1.66 compared to the control group, and by a factor of 1.32 compared to the group that received only the nudge without actively deciding for it. Besides developing an experimental methodology to test self-nudging experimentally, the present study therefore provides evidence for the potential of self-nudging to increase autonomy and transparency in the application of behavioral interventions online.

Keywords: self-nudging, misinformation, accuracy nudge, online intervention

Presentation type: Oral presentation / Talk

Session: False information and memory

Studying Cognitive Processes in Virtual Space - Results from an EEG Experiment on Auditory Distance Perception

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Using virtual reality (VR) in cognitive neurosciences can facilitate the transfer of research from the lab into more life-like environments. However, it is crucial to verify that results obtained in VR experiments correspond to those obtained under laboratory/real-world conditions. As a first step in the development and validation of a VR-based test environment, we focused on auditory distance perception and analyzed event-related potentials (ERPs) evoked in a real and the corresponding virtual space. In an auditory change detection ("oddball") paradigm, N=20 participants were exposed to broadband sounds emitted by three loudspeakers placed at distances of 2m (near), 4m (center), and 8m (far) relative to the participant. Participants had to react to those sounds deviating in their distance and hence spatial position from the center loudspeaker (acting as standard sound). In one condition, sounds were generated by the loudspeakers themselves (real environment), whereas in the second condition virtually generated sounds were played via headphones (virtual environment). During the experiment, continuous EEG was recorded. Across both environments, we found

similar ERP patterns such as the mismatch negativity and P3a component as neuro-cognitive correlates of deviant detection and attentional orientation, respectively. Looking at ERPs evoked by the two deviant sound positions, in both environments sound emitted by the far loudspeaker generated a delayed P3a in comparison to the near loudspeaker. Results demonstrate that similar neural processes were elicited in virtual and real spaces. Future research has to validate these indications, also by adding the visual virtual domain in more complex multisensory scenarios.

Keywords: Virtual Reality, Distance Perception, Auditory Oddball, Mismatch Negativity, EEG, ERP, Auditory Cognition

Presentation type: Oral presentation / Talk

Session: Aesthetics and perception

Validation of free-recall-then-recognition multinomial processing tree model

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Previous multinomial models that aimed at separating storage and retrieval processes typically focused on associative memory for (semantic) word pairs (e.g., knife – fork). However, we are interested in storage and retrieval for individual items, so for single words that are not necessarily clusterable and are therefore less likely to induce associative strategy use. To this end, we developed a free-recall-then-recognition paradigm and multinomial processing tree model with parameters that represent storage, retrieval in free recall, retrieval in recognition, and guessing. Experiment 1 revealed interesting effects of test-format expectancy. Participants who expected a free recall test (n = 38) showed better storage and recall retrieval than those who expected a recognition test (n = 38). While this pattern reversed for the guessing parameter, the recognition retrieval parameter was, somewhat surprisingly, not affected. Before further interpreting these effects, it is necessary to systematically validate all parameters to understand whether they correspond to our hypothesized memory processes. In Experiments 2 and 3, which are currently underway, we aim at selectively influencing the guessing parameter by manipulating the base rates of distractor items in the recognition test and the recall retrieval parameter by cueing participants with the first letters of the study words. The results of these experiments will be discussed with respect to the validity of the proposed measurement model.

Keywords: episodic memory, multinomial processing tree, cognitive modeling

Presentation type: Poster Presentation

Session: Memory and working memory

Switching between dichotic voices cued by gender or location: do preparation and feature binding interact?

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Previous research shows that one can attend effectively to one of multiple simultaneous voices, but switching attention between them incurs a substantial “switch cost”. Using a “voice switching” paradigm where the target voice was defined (and visually cued), by gender or location (target dimension separated by session), we investigated the effect of switching the irrelevant dimension. Feature binding accounts posit that features of the irrelevant perceptual dimensions of a stimulus might become bound to features of the relevant dimension. In particular, a change of feature of the irrelevant dimension, relative to its repetition, could reduce the benefit of attending to the same feature and/or facilitate switching to a different feature of the relevant dimension, due to automatic retrieval of the feature of the irrelevant dimension. We investigated this potential effect of binding on the switch cost (the cost of changing the feature of the relevant dimension) and its modulation by preparation (cue-stimulus) interval. The switch cost was reduced when the feature of the irrelevant dimension changed, mainly due to worse performance for feature repetitions on the relevant dimension; this was observed irrespectively of which dimension was relevant. A longer preparation interval significantly reduced the switch cost but did not interact with the effect of binding on the switch cost. This suggests two distinct types of process: top-down preparatory tuning of attention to a perceptual dimension, and bottom up, automatic, binding between features of the relevant and irrelevant dimensions, which is impervious to the effects of preparatory top-down control.

Keywords: Auditory attention, attention switching, binding

Presentation type: Oral presentation / Talk

Session: Binding

When time matters: The influence of perceptual and conceptual processing fluency on the repetition-based truth effect as a function of retention interval length

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People are more likely to judge repeated information as true compared to novel information (the so-called truth effect). A key explanation for this phenomenon is the experienced fluency during the processing of repeated information. In fact, based on semantic and verbatim aspects, information repetition can be considered as a source of both: conceptual as well as perceptual fluency. Recent research suggests that the relative influence of conceptual and perceptual fluency on the repetition-based truth

effect varies with the time between information presentations. However, in previous experiments conceptual and perceptual fluency was manipulated by changing the statements' content to investigate these influences as a function of time (i.e., contradictory vs. non-contradictory statements, verbatim repetitions vs. paraphrases). In our study, we systematically manipulated perceptual processing fluency independently of the statements' content to test the impact of different fluency accounts as a function of retention interval length. In addition to the fluency manipulation via repetition, we realized two judgment phases (10 minutes and 1 week after first exposure) and two experimental groups: One group was exposed to a short screen flickering in the middle of each statement presentation; the other (control) group received statement presentations without perceptual manipulations. Data collection is at an advanced stage, so that our findings can be presented at the conference.

Keywords: conceptual fluency, perceptual fluency, truth effect, retention interval length

Presentation type: Oral presentation / Talk

Session: Spatial and temporal perception

A Systematic Meta-Analysis of Demographic and Psychological Factors Underlying Online Misinformation Veracity Judgements

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Many scholars agree that misinformation poses a serious threat to democracy, noting that the way(s) it is impacting the democratic process remains mostly unknown. As a response, a large effort is currently underway to uncover factors that make one vulnerable to misinformation. While this body of research has been instrumental for our understanding, the literature is fragmented, making it difficult to derive general conclusions about the importance and comparative strength of different factors. Research on key standard demographics (such as age, gender, education, and political identity) and psychological factors (such as analytical thinking, partisan bias, motivated reflection, and familiarity) is largely scattered, and in some cases, not frequently reported. Here, we aim to aggregate these disparate findings by conducting a systematic meta-analysis, synthesising the evidence for the impact of general demographic and psychological factors on misinformation veracity judgements. We carry out a reanalysis of raw data using signal detection theory (SDT) for statistical inference. Critically, SDT provides a more nuanced understanding of news veracity, as it can distinguish between one's ability to judge between true and false news (i.e., discrimination ability) and one's response tendencies (i.e., response bias; the likelihood of selecting one option [true news] over another [false news]). Overall, with this

systematic meta-analysis, we aim to better understand the role of the above-mentioned demographic and psychological factors on misinformation veracity judgements, ultimately helping to inspire further theory and intervention building.

Keywords: analytical thinking, false news, illusory truth effect, misinformation, motivated reflection, partisan bias, signal detection theory

Presentation type: Oral presentation / Talk

Session: Misinformation Research - Quo Vadis?

Enhanced Source Memory for Emotional Sources: What Is the Role of Encoding Instructions?

Nikoletta Symeonidou, Beatrice G. Kuhlmann

University of Mannheim

Previous research on whether source memory is enhanced for emotional sources yielded inconclusive results. To clarify these inconsistencies, we examined whether encoding instructions moderate source-emotionality effects. In both experiments, we used neutral words as items superimposed on emotional (negative or positive) or neutral pictures as sources. Source memory was measured with a multinomial model. In Experiment 1 (N = 68), we applied an affective, item-focused orienting task (i.e., word-pleasantness ratings) during encoding and found enhanced source memory for emotional (positive and negative) compared to neutral sources. In Experiment 2 (N = 216), we systematically manipulated encoding instructions and found that emotionality effects in source memory only occur with an affective orienting task (as in Experiment 1) but do not occur with an integrative orienting task (item-source-fit judgments), a purely item-focused orienting task (living-non-living judgments), or with intentional (vs. incidental) item (vs. source) learning. Thus, our research overall suggests that emotional sources per se are not remembered better. Rather, source-emotionality effects might unfold only if affective item processing takes place.

Keywords: source memory, emotion-enhanced memory, orienting task, multinomial modeling

Presentation type: Oral presentation / Talk

Session: Source Memory

Reconstructing neural representations of tactile space in the sensorimotor areas

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Psychophysical experiments have demonstrated large and highly systematic perceptual distortions of tactile space. Several behavioural studies have investigated such distorted representations, however, the neural bases of such distortions are unknow. Here I will present a study in which we examined the neural basis of tactile distance perception by analysing activity patterns induced by tactile stimulation of nine points on a 3 x 3 square grid on the hand dorsum. I will describe empirical evidence showing that the primary somatosensory and motor cortices, rather than higher-level brain areas, are critical to estimating distances between tactile stimuli on the hand dorsum. By combining functional magnetic resonance, Procrustes alignment, and multidimensional scaling, we reconstructed the shape of skin space in the brain. Strikingly, the shape of the skin that we reconstructed from neural data matches the distortions we found at the behavioural level, providing strong evidence that early sensorimotor areas are critical for the construction of tactile space.

Keywords: Shape of the skin, Tactile distance perception, Somatosensory and motor cortices, Body distortions, fMRI

Presentation type: Oral presentation / Talk

Session: Touch in context: from the body to the external world

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Testing the Serial Processing Model of Item and Source Retrieval: Applying the Additive Factor Method to Source Monitoring

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Sternberg's (1969) additive factor method (AFM) is a longstanding technique to test the seriality of latent cognitive processing stages based on individuals' observable response times (RTs). The AFM requires selective manipulations affecting the processing time of a single stage without changing the durations of other stages. If experimental factors influence different processing stages selectively, the combined effect of these factors on the mean RT is additive, statistically manifested by significant main effects and no interaction. In contrast, the presence of an interaction conflicts with the assumption that two stages are strictly serial, indicating temporal overlap of subprocesses to some extent. By implementing the AFM to source monitoring, our aim herein is to test whether retrieval processes for an item (e.g., what was said?) and its source (e.g., who said it?) operate serially or in parallel. Inspired by the selective effects observed on memory performance, we manipulated item encoding (i.e., generating versus reading the study items; Mulligan et al., 2006) and source similarity (i.e., dissimilar versus similar sources; Bayen et al., 1996) in a fully crossed between-subjects factorial design. In Experiment 1 (N = 128), source similarity affected source latencies but item generation unexpectedly did not result in faster item retrieval despite the expected performance benefit, preventing further application of the AFM. With a modified procedure, Experiment 2 (N = 128) yielded the expected selective effects on item and source latencies, and the

additivity of these effects on item latencies suggests seriality of item and source retrieval.

Keywords: additive factor method, item memory, response time, source memory, source monitoring

Presentation type: Oral presentation / Talk

Session: Source Memory

Suppression and Omission Effects in Auditory Predictive Processing – Two of the same?

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Two types of modulations of the auditory N1 event-related brain potential component are often discussed as expression of auditory predictive processing. First, the sound-related N1 component is attenuated for sounds generated by the listener compared to the N1 elicited by externally produced sounds (N1 suppression). Second, when participants are asked to generate sounds by pressing a button, an omission-related component in the N1 time-range is elicited if the sound is occasionally omitted (omission-N1). The phenomena of N1 suppression and omission-N1 were explained by specific forward modeling that takes place when the sensory input is predictable: Prediction error is reduced if forward model and sensory input match (N1 suppression) and enhanced if they mismatch (omission-N1). This common theoretical account for both phenomena is appealing, but it has not yet been directly tested. We manipulated the predictability of a sound in a self-generation paradigm in which in two conditions either 20% or 50% of the button presses did not generate a sound, inducing a strong or a weak expectation for the occurrence of the sound. In agreement with the forward modelling account, an omission-N1 was observed in the 20% but not in the 50% condition. However, N1 suppression was highly similar in both conditions. Thus, our results demonstrate a clear effect of predictability for the omission-N1, but not for the N1 suppression. This implies that the N1 suppression and the N1 omission phenomena rely on (at least partly) different mechanisms and it puts prediction related accounts for the N1 suppression in question.

Keywords: N1 components, Self-generation, Auditory, EEG/ERP, Predictive processing

Presentation type: Poster Presentation

Session: Auditory processing

How Social Connectedness Impeded Adherence to Preventive Measures during the COVID-19 Pandemic

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During the COVID-19 pandemic, physical distancing was one of the more important behaviours for reducing the spread of the virus. The present study investigated the influence on pathogen avoidance of familiarity with other people at private gatherings. Based on the social identity model of risk taking and the theory of the behavioural immune system, we assumed that greater familiarity with others would make people feel more connected with one another and decrease situational pathogen avoidance. This could result in lower perceptions of the risk of contracting COVID-19 and fewer protective behaviours. Two experiments (n1 = 1022, n2 = 994) showed that the negative influence of greater familiarity on the perceived risk of infection and protective behaviour is explained by an increased feeling of connectedness and less feeling of situational pathogen avoidance. In an additional survey, the participants (n = 23,023) rated the quality of their past social contacts. The correlational analyses showed that the familiarity of the other person was more important in explaining variance in protective behaviours than attitudes toward those behaviours or the pandemic situation itself. Knowing more about the processes that turn social gatherings into potential super-spreader events can improve infection control in the future.

Keywords: health, COVID-19, preventive measures, connectedness, disgust, social identity, behavioural immune system

Presentation type: Oral presentation / Talk

Session: Public health and disorders

Transferring predictions from one visual cue to another in implicit learning

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When we process stimulus characteristics and our motoric response, we integrate them to have a coherent episodic representation of the event – an event file. In this study, we tested a prediction derived from the event file hypothesis that learning contents can be transferred from one visual feature to another if the features have been bound together in an event file. We did so in an implicit learning paradigm, because there are conflicting theoretical assumptions on whether such integrative processes should be possible in the absence of awareness.

We used a visual search task in which three out of six distractor shapes predicted the target position in a learning phase. In the transfer phase, three out of six distractor colors predicted the target position. In a pre-learning phase, in the experimental condition, each of the six shapes had been bound to a color. In the control condition, the shapes had been associated with meaningless spatial positions. We found that in both conditions, response times to the target in a predictable position was faster than to an unpredictable position. But only the experimental condition showed a transfer effect when the distractor shapes were replaced with colors. The associations of shapes and colors with target positions remained implicit. We discuss these findings against the background of consciousness theories and the event file hypothesis.

Keywords: implicit learning, learning transfer, contextual cueing, event file hypothesis, consciousness

Presentation type: Poster Presentation

Session: Stimulus-response and response-effect binding

Do infants anticipate others' belief-related actions by biased object memory?

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In previous studies, infants younger than 2 years have demonstrated correct expectations of how an agent with a false belief will act. However, the robustness of these findings and the underlying mechanism remain a matter of debate. The altercentric account proposes that infants'' own representation of the world may be biased by the view of others. Specifically, infants might misremember objects based on where others saw them, allowing them to predict where the other will search for the object later on. Here, we tested whether infants' object representation and memory is spontaneously modulated by an agent's belief. In a preregistered eye-tracking study, we presented infants, aged 8-10 and 17-19 months, with videos, in which an agent observes an object moving into one of two locations. Subsequently, the agent then either observes (True Belief) or misses (False Belief) the object's change of location from location A to B. We predict that infants' expectation of the objects' location is altercentrically modulated, i.e., that infants expect the object where the agent believes the object to be. We test whether infants who correctly anticipate the agent's action in the false belief condition also expect the object in the believed rather than the real object location. We have currently tested N=77 children and results are expected by January 2023.

Keywords: Theory of Mind, anticipatory looking, pupillometry, eye tracking, altercentric cognition, object representation

Presentation type: Poster Presentation

Session: Moral decisions and social interaction

How strong is Psychology's fundament? A Meta-Analysis of Classical Psychological Findings

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A common problem among researchers who summarize the field as part of a lecture or textbook is how trustworthy the fundament of psychology actually is. To estimate the replicability of classical psychological findings, we coded test statistics comparing for all studies listed on Wikipedia's table of classical psychological findings (https://de.wikipedia.org/wiki/Liste_der_klassischen_Experimente_in_der_Psychologie). Standardized effect sizes could be computed for 18 out of 56 publications (31 effect sizes). Expected replicability rate according to Z-curve is 64% with 95% CI [39%, 90%]. Regarding quality assurance and advancement of knowledge, our results suggest that further replication studies are needed to examine existing classical psychological findings.

Keywords: classical psychological findings, meta-analysis, trustworthiness, review

Presentation type: Oral presentation / Talk

Session: Replicability

Evaluation of a vehicle interior concept for work and entertainment in automated driving vehicles

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The goal of the research project RUMBA, which is funded by the German Federal Ministry for Economic Affairs and Climate Action, is to redesign the user experience for occupants during an automated drive (SAE level 4) by developing innovative interior and interaction concepts. As part of the second iteration of the user-centered, iterative development process, a laboratory study will be presented. It aims to evaluate a simulated prototype of an innovative vehicle interior concept for work and entertainment during automated driving as well as to identify design suggestions for its further development. The vehicle interior concept to be evaluated will be compared with a classic vehicle interior in an experimental research setting. The test subjects experience each vehicle interior prototype during two 15-minute simulated, automated drives. In the first ride, one subject performs work tasks while the other watches a movie; in the second ride vice versa. Besides others, user experience, system trust and subjective

road safety of the occupants are measured. The contribution reports the methodology as well as first results of the evaluation study.

Keywords: automated driving, user-centered development, user experience, vehicle interior, simulation prototype

Presentation type: Oral presentation / Talk

Session: Automation while driving – current problems and approaches

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Repetition of the Ranschburg-effect in the 21st century

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Background: The Ranschburg-effect (or Ranschburg inhibition), named after Hungarian psychologist Paul Ranschburg, is the phenomenon that appears in serial recall from short-term memory, meaning that recall performance of repeated items in serial lists is decreased, compared to the recall performance of non-repeated items. **Aims and methods**: The purpose of our research was to re-examine this phenomenon and test whether the Ranschburg-effect is still valid and demonstrable. The task of the participants (N= 60; 12 men, 48 women; agemean= 20,47± 1,37) was to recall a series of six-item sequence immediately after a few seconds of presentation. Of the 36 sequences 18 were heterogeneous (e.g. RQJHVM), while the rest included two homogenous (e.g. RQJHJM) items. To analyze the recall performance between these two conditions, Wilcoxon Rank Sum Test was applied. **Results**: We have found that the within-sequence repetition of an item caused a significant reduction (Z= -2,719; p= 0,007) in recall accuracy. **Conclusion**: The result of this research indicates that the Ranschburg-effect is still relevant and detectable, thus, our results provide further evidence of the hypothetic failures in guessing strategy when repeated items are present (Hinrichs et al, 1973), as the explanation of Ranschburg-effect. **References**: Hinrichs, J. V., Mewaldt, S. P., & Redding, J. (1973). The Ranschburg effect: Repetition and guessing factors in short-term memory. Journal of Verbal Learning and Verbal Behavior, 12(1), 64-75.

Keywords: Ranschburg-effect, guessing strategy, recall performance

Presentation type: Poster Presentation

Session: Memory and working memory

Measuring the Desire for Aesthetics. The German Version of the Desire for Aesthetics Scale (DFAS-G)

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People differ in the extent of their Desire for Aesthetics. While some seem to have only a superficial interest in aesthetics, others live for it. However, no measurement tool is presently available to assess the Desire for Aesthetics in different domains in German-speaking populations. We conducted two studies to adapt the English Desire for Aesthetics Scale (DFAS) into a German version and examined its psychometric properties. In Study 1 (N = 317), we selected a translated item pool and assessed the scale's factor structure. Our analyses resulted in a four-factor solution representing the Desire for Aesthetics in four domains: Visual Arts, Individuals, Music, and Habitat. In Study 2 (N = 304), we revised and cross-validated the scale and examined the final 37-item DFAS-G for reliability and validity. We found good internal consistency for the global scale (Cronbach's alpha = .87) and all subscales (.74 to .82). We also observed convergent validity for the Big Five personality trait Openness to Experience and Aesthetic Perception, and confirmed a hypothesized relation between the DFAS-G subscale Visual Arts and Art Interest. Finally, we found discriminant validity with Intellectual Curiosity and Creative Imagination. Additional assessment of re-test reliability is the subject of an ongoing study. The comprehensive measurement of individual differences in aesthetic desire is an essential direction for modern aesthetics research.

Keywords: Desire for Aesthetics, German scale, Validation, DFAS-G, Personality

Presentation type: Oral presentation / Talk

Session: Experimental Aesthetics Following Fechner's Conceptions I

Localization Errors in Context

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In laboratory experiments, it has often been reported that observers tend to mislocalize the position of moving objects. In most such studies, the target object in question is relatively simple (e.g., a single dot or a line), and its local motion is presented in isolation, devoid of the usual global context present when things move in the world around us. Is global context then irrelevant for understanding how we perceive the position of moving objects? Here I will argue that it is not, for at least two reasons. First, global scene context may typically provide additional reference information that can anchor/improve local estimates of object motion, helping to reduce localization errors. Second, integration of local motion components within an object or scene may sometimes dramatically alter our overall, global percept (e.g., biological motion, aperture-effect). We might expect such global dynamics to also modulate patterns of localization. Here I will provide evidence from two recent representational momentum (Freyd & Finke, 1984) studies that specifically address this second aspect of context.

Keywords: Motion, localisation, context, representational momentum

Presentation type: Oral presentation / Talk

Session: Spatial changes over time: current developments in motion perception

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No Description–Experience Gap in Choices Between a Described and an Experienced Option

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People choosing between risky options seem to evaluate the options differently depending on whether they learn about them from a summary description (*decisions from description*) or from drawing sequential samples from the payoff distribution (*decisions from experience*). Does this impact of learning mode on the evaluation of risky options—referred to as *description–experience gap*—depend on whether the choice is between options presented in the same vs. different learning modes? And do people draw more samples from an experienced option when the alternative option is described (vs. experienced) in order to align the certainty about the payoff distributions across options? We examined these questions by comparing people's choice and search behavior in a mixed-mode condition, where they chose between a described and an experienced option, with behavior in a purely description- or experience-based condition. Using cumulative prospect theory to model choices and measure people's subjective representations of outcome and probability information, we found clear differences between the purely description-based and the purely experience-based conditions. In the mixed-mode condition, however, the discrepancies in the subjective representations of the described and the experienced options disappeared. As expected, per-option search effort was higher in the mixed-mode condition than in the purely experience-based condition. Our findings underscore the importance of studying the many facets of the choice context—that also includes the learning mode of context options—in order to fully understand both information search and the mechanisms of preference construction in risky choice.

Keywords: risky choice, decisions from experience, sampling, description–experience gap, cumulative prospect theory, hierarchical Bayesian modeling

Presentation type: Oral presentation / Talk

Session: Strategic information search in inferences and decisions under uncertainty

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How do pianists convey teaching intentions?

Atsuko Tominaga

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Social learning plays an important role in skill transmission. When learning highly complex skills such as musical expressive techniques, experts and novices need to work closely and interact with each other for successful skill acquisition. This talk will share the findings from my doctoral research, which investigates how expert pianists modulate their performance for teaching and how such pedagogical modulations are perceived by listeners. Exaggeration of movement is often used to signal a communicative intent to others during real-time interactions (Pezzulo et al., 2019), including teaching contexts (Brand, Baldwin & Ashburn, 2002; Saint-Georges et al., 2013; Uther, Knoll & Burnham, 2007; McEllin, Knoblich & Sebanz, 2017). We examined whether and how exaggeration for the purpose of teaching operates for actions that are expressive even when performed outside of a teaching context. We focused on how pianists modulated their performance to teach musical expressive techniques such as articulation (smoothness of sound) and dynamics (loudness of sound). We found that expert pianists exaggerated relevant aspects of the performance to teach a specific technique. Such exaggeration was also perceived by listeners and used to infer teaching intentions. These results extend the research on infant-directed speech and action and contribute to understanding the learning process of highly complex skills, where subtle action (sound) modulations are needed to implement artistic expression.

Keywords: teaching, learning, skill transmission, sensorimotor communication, music, artistic expression

Presentation type: Oral presentation / Talk

Session: Perceiving and understanding cues in others' actions

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Semantic classifier congruency in the first and second language

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We focused on the classifier as semantic-syntactic language feature and examined the semantic classifier congruency effect in language production. In three experiments, participants first saw or heard a classifier (e.g., a pair of) and then had to name a picture showing a person or an object (e.g., shoes). In these classifier + noun phrases, the classifier was either semantically congruent to the noun (e.g., a pair of shoes) or incongruent (e.g., a bowl of shoes). In Experiment 1 (n = 26), English monolinguals were tested in English and results showed better performance in the semantically congruent condition than in semantically incongruent condition (i.e., a semantic classifier congruency effect). In Experiments 2 (n = 40) and 3 (n = 40), Chinese-English bilinguals were tested with both Chinese (L1) and English (L2) classifier + noun phrases intermixed in the experiments. The semantic classifier congruency effect was replicated but was significantly larger for L1 than for L2. Further the effect also differed as a function of classifier modality, indicating a larger effect with an auditory than with a visual classifier presentation. Additionally, language switch costs were found in both semantically congruent and incongruent conditions but were smaller in semantically

congruent as compared to incongruent conditions. Together, these findings provide evidence for a semantic classifier effect in both L1 and L2. Furthermore, they suggest that semantic classifier congruency interacts with language switching, suggesting an influence of semantic-syntactic language features in bilingual language control.

Keywords: semantic classifier congruency effect; language switching; modality effect

Presentation type: Oral presentation / Talk

Session: Memory, Speech and language processing

Anticipated events impact action selection and execution in 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 to-be-prevented events are represented, however, has widely been neglected in the past. Recent proposals in the literature suggest a distinction between the control of operant and prevention actions, i.e., that environment-related effects permeate the representation of operant actions whereas they do not play a role past initial decisions in case of prevention actions. Here we present data from movement trajectory experiments as well as findings on response durations for simple keypress responses that indicate equal influences of spatial and temporal features for to-be-produced effects and for to-be-prevented events alike. This implies that selecting and executing prevention actions relies on anticipated environmental changes.

Keywords: Prevention, action representation, ideomotor framework

Presentation type: Oral presentation / Talk

Session: Anticipation and prediction

Features in Time and Space: Non-spatial Inhibition of Return Emerging at Late Responses

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Inhibition or Return (IOR) describes the phenomenon of responding more slowly to a stimulus that appears at the same location as a recently presented cue or target relative to an appearance at other locations. IOR has been widely researched and is still subject to many studies in which “return” especially means to return to the location. However,

there are also some studies reporting *non-spatial IOR effects*, which are based on repeating or changing non-spatial features like colour or shape. While spatial IOR emerges in many designs, it is not clear which conditions must be fulfilled to generate non-spatial IOR. Based on previous findings we hypothesized that slower responses lead to the emergence of a colour-based inhibition effect. In the current task, participants signaled the detection of a target, that was preceded by a cue with the same or a different location and/or colour. We introduced several inter-stimulus-intervals and cue durations to provoke overall slower responding. The analysis revealed faster responding for trials with the colour changing from cue to target, specifically emerging at location repetitions. In addition, this effect was positively correlated with mean reaction times and a percentile analysis showed that the effect emerged at late responses, supporting the idea that slowed responding can lead to the emergence of non-spatial IOR, even in simple cue-target designs. These findings suggest that researchers aiming to find modulations by non-spatial features in attentional orienting paradigms should develop designs that stimulate late responding.

Keywords: Attentional orienting, Inhibition of Return, Feature-based Inhibition, Response Time Distribution

Presentation type: Poster Presentation

Session: Cognitive control and conflict

Depression, anxiety and satisfaction with life in patients with polycystic ovary syndrome

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Polycystic ovary syndrome (PCOS) is a multi-systematic disease with a genetic predisposition, manifesting in increased risks for various metabolic diseases and its comorbidities, such as infertility, hyperandrogenism, insulin resistance, type 2 diabetes and cardiovascular diseases (Marki et al., 2014). Apart from the physiological consequences, patients also often suffer from psychological consequences, such as depression, anxiety and a lower quality of life (Teede et al., 2010). Given its heterogeneous symptoms, the treatment of PCOS encompasses several medical areas. Due to the nature of the condition, PCOS patients suffer both from primary and secondary psychological consequences. The primary psychological consequences stem from the hormonal imbalance, while the secondary psychological consequences follow the emotional burden patients face. Despite this phenomenon, medical treatment of PCOS often only focuses on the physiological sypmtoms, and psychological problems remain untreated. Psychological problems however often impact the physiological symptoms, thus worsening the condition. A recent study aimed to explore this multidimensional syndrome, and its relation with depression, anxiety, satisfaction with life, self-efficacy and certain demographic variables. Analyzing data of women with and without PCOS, statistically significant difference was observed in their values of depression [$t(95.62)=-4.959$, $p<0.001$], and satisfaction with life [$t(99.40)=3.062$, where

p<0.05].No significant difference was found related to their values of anxiety, self-efficacy and their demographic values. The result of the research project suggests that screening and prevention of depression should be part of PCOS treatment, and patients need accurate information about the long-term risks associated with this condition in order to achieve a sustainable lifestyle change.

Keywords: PCOS, depression, anxiety, satisfaction with life

Presentation type: Oral presentation / Talk

Session: Public health and disorders

Kinship recognition in the human voice

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Kinship (genetic relationship) recognition is known in various species and evolutionarily considered a function of inbreeding avoidance and nepotism. In humans, kinship recognition can be seen as one crucial organising component of societies. While there are a number of studies on kinship recognition based on faces, little is known about kinship recognition in voices. The present study investigated whether voices of female sibling pairs with different degrees of relatedness (monozygotic twins, dizygotic twins and non-twin siblings) are distinguishable from unrelated female individuals. Voice samples were recorded from eighteen young adult siblings (nine pairs, three per category) and each sibling's voice was presented to 63 participants together with another voice (either from the related pair, or an age- and gender-matched sibling from another unrelated pair). Stimuli consisted of short German sentences and vowels. The listeners were asked to judge whether they heard a related or an unrelated pair, and rated their confident level for each response. Listeners' performance to detect kinship was significantly above chance level (d' = .467) and particularly high for monozygotic twins (d' = .645). Furthermore, we found that kinship was recognised better with sentence stimuli compared to vowel stimuli. Overall, this study provides the first empirical evidence for human kinship recognition from voices.

Keywords: voice, kinship recognition, genetic relationship, twins, similarity

Presentation type: Poster Presentation

Session: Language

Social Offloading: Evidence for socially embedded distractor suppression

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Attention mechanisms do not exist in isolation but in a world rich in context. With evidence from the joint picture word interference (PWI) paradigm, I demonstrate how meaningful social contexts have the power to facilitate distractor suppression in ways that are sensitive to the social dynamics of dyadic interactions. In the PWI paradigm, participants respond to target pictures while ignoring distractor words. If pictures and words are semantically related, then interference slows responses. Our findings consistently demonstrate that this distractor interference is removed when participants believe they are working with another person, but only when that person engages with the distractor word, and is perceived as having particular social traits, such as high status or competency. I conclude that social environments afford the offloading of task-irrelevant distraction in a socially sophisticated manner (social offloading), and I highlight the importance of re-worlding participants in meaningful contexts to reveal the embeddedness of behaviour.

Keywords: Social Attention, Cognitive Offloading, Situated Cognition, Social Contexts

Presentation type: Oral presentation / Talk

Session: Cognitive building blocks in social contexts

Integrating spatial attention dynamics in visual foraging with TVA

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Visual foraging tasks, where observers collect different item types from “patches”, are a versatile tool for studying selective attention in more naturalistic scenarios than other typical attention tasks can provide. TVA has mainly been applied to rather rigid experimental tasks, such as letter-based whole and partial report tasks. In ongoing work aimed at merging TVA’s formal modeling with the flexibility of foraging tasks, we have implemented simulations of foraging with TVA-inspired attentional control mechanisms, replicating the characteristic “run behavior” seen in foraging with repeated selections of same-type elements. However, these simulations have also demonstrated the need to dynamically adjust the focus of spatial attention: During “cruise phases” of foraging, where foragers quickly select items of a single type, a small spatial focus (often called functional viewing field) seems beneficial, favoring nearby items and thereby minimizing the overall distance foragers have to move across the patches. But between such phases, no targets may be nearby, so the functional viewing field should be expanded to enable the selection of more peripheral targets. Here we systematically investigate adjustments of the functional viewing field by comparing different simulations to empirical data. We discuss the reciprocal implications for attention control during foraging and for the application of TVA to naturalistic scenarios.

Keywords: TVA, visual attention, visual search, visual foraging

Presentation type: Oral presentation / Talk

Session: Advances in TVA-based visual attention research I: Basic and Applied

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On the beauty of vases: Birkhoff's aesthetic measure versus Hogarth's line of beauty

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University of Konstanz

Vases have continued to be important aesthetic objects across almost all developed cultures. Still, there is few to no systematic research investigating the shape properties that determine their beauty. A famous exception is Birkhoff (1933), who used the geometric relations of vases for calculating their beauty. However, one shape factor he theoretically considered, but did not include in his aesthetic measure is the outline curvature of vases. Already in 1753, William Hogarth emphasized curvature as relevant for aesthetic appreciation, when he introduced his "Line of Beauty" as the most beautiful shape. Given the influence of both theories it is astonishing that empirical investigation is lacking. Therefore, we produced 25 symbolic vases, where we systematically varied width and curvature and asked participants to rate their beauty in an online experiment. Multiple regression results show that both geometric relationships and curvature contribute to the beauty of vases.

Keywords: vases, curvature, line of beauty, Birkhoff, aesthetic measure

Presentation type: Oral presentation / Talk

Session: Experimental Aesthetics Following Fechner's Conceptions II

Source memory and collaborative learning: The role of group composition and conflicting information

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Source memory is important in collaborative learning scenarios: when learners receive new information from learning partners with differing knowledge-levels, remembering the source helps to better assess the reliability of information in retrospect. Moreover, learners sometimes receive information from partners which is conflicting with prior received information. This enhances source memory, as receiving conflicting information guides attention to sources. In a 2×2 between-subject experiment, we examined the effects of group composition (three partners with differing knowledge-

levels vs. same knowledge-levels) and conflicting information (with conflict vs. without conflict) on source memory and knowledge acquisition in a pseudo-collaborative learning scenario (*N* = 128). Three bogus partners presented texts with information which either contradicted information participants received earlier or did not. Group composition and conflicting information did not influence knowledge acquisition, but both factors influenced source memory: analyzes with multinomial processing tree models revealed that participants better remembered which partner presented certain information in groups with differing knowledge-levels. High-knowledge and low-knowledge partners were remembered better than medium-knowledge partners. However, only the source memory advantage for high-knowledge partners was significant, partially suggesting that in collaborative learning, remembering which information might be right is rendered more useful than remembering which information might be wrong. Contrary to our hypothesis, source memory was worse in a context with conflicting information. Our findings contribute to a better understanding of context-dependent source memory and thus, consequently, to the question how remembering whether certain information might be right or wrong is adaptively prioritized in different contexts.

Keywords: Collaborative learning, Multinomial modeling, Source memory

Presentation type: Oral presentation / Talk

Session: Source Memory

Effects of Anticipation on Working Memory and Attentional Control in the Context of Task Interruptions

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Leibniz Research Centre for Working Environment and Human Factors

Interruptions are characterized by a brief suspension of a primary task due to the handling of a secondary task. Prior research indicated advantages of the possibility to prepare for an interrupting task. Here, we investigated the neurocognitive processes underlying such cognitive preparation by means of the EEG. We focused on the lateralization of alpha power relative to the position of task-relevant information as a correlate of the spatial focusing of attention. This oscillatory effect was measured during a working memory task based on lateralized visual stimuli which was interrupted by a 2AFC arithmetic task. Before every ten trials, an announcement was made to the participants whether they would be interrupted or not (always interrupted, never interrupted, randomly interrupted). First results pointed toward a decrease in performance in the primary task following interruptions, which was more pronounced when interruptions could not be anticipated. On EEG level, there was a stronger suppression of alpha power at posterior recording sites contralateral than ipsilateral to the side of task-relevant information in an initial memory array. This lateralized effect re-appeared following the completion of the interruption task, reflecting a re-focusing of attention on the primary working memory task. Importantly, contralateral alpha power suppression was stronger when participants could anticipate the interrupting task,

indicating that cognitive preparation helps with the re-focusing of attention on task-relevant information after interruptions.

Keywords: cognitive control, interruptions, working memory, attention, EEG, neural oscillations

Presentation type: Poster Presentation

Session: Memory and working memory

Why Do Judgments of Learning Modify Memory? Evidence from Identical Pairs and Relatedness Judgments

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There is accumulating evidence that making judgments of learning (JOLs) while studying word pairs improves memory for related but not for unrelated pairs. To explain these findings, it has been proposed that people process cue-target relatedness more when making JOLs than they do spontaneously. We directly tested this relatedness-processing assumption with unrelated and related word pairs as well as with identical word pairs, a type of material that has not yet been used in JOL reactivity research. In three experiments, participants did or did not make JOLs while studying word pairs for a cued-recall test. They also indicated at test whether each cue appeared at study with an unrelated, a related, or an identical target before attempting to recall it (relatedness judgments). Results revealed that making JOLs improved memory for related and identical word pairs but not for unrelated word pairs. Independently from these effects on memory performance, making JOLs improved the accuracy of relatedness judgments. These findings provide direct evidence for the relatedness-processing assumption and thereby extend our understanding of JOL reactivity. More generally, this study suggests that instructions to monitor one's learning can direct attention to information that is not or less processed otherwise.

Keywords: metamemory; judgments of learning; metacognition; reactivity

Presentation type: Oral presentation / Talk

Session: Learning and models

Social instructions: The formation of shared task sets in a collaborative context

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Through language, humans have the capacity to instruct others to perform parts of a collaborative task. Receiving verbal instructions on upcoming tasks has been shown to activate a corresponding task set, which in turn can affect the execution of presently ongoing task behavior ("instruction-based reflexivity", Liefhooge et al., 2012). Here we investigate whether such preparatory task sets are also formed when giving verbal instructions to a task partner. In a series of four experiments, we adapted the instruction-based reflexivity (IBR) paradigm to investigate whether instructing another person leads to processing the instruction content and thus forming a corresponding task set on behalf of the task partner (Experiment 1). In addition, we tested if the formation of such shared task sets is induced by the collaborative task (i.e., the act of instructing the task partner), or rather by the instructor merely reading (i.e. Experiment 2, 3), hearing (i.e. Experiment 3), or repeating the instructions aloud (i.e. Experiment 2, 3), without having a task partner. In Experiment 4, we directly compared collaborative and individual contexts, to determine whether the shared task sets could alternatively be explained by lower-level characteristics of the task. We found evidence for the formation of task sets in response to instructing a task partner. These effects however are rather small and seem to be, at least in part, elicited by lower-level characteristics associated with the act of verbalizing instructions.

Keywords: Instruction-Based Reflexivity, Shared Task Sets, Social Cognition, Instructions

Presentation type: Oral presentation / Talk

Session: Cognitive building blocks in social contexts

RESTING STATE FUNCTIONAL CONNECTIVITY MARKERS FOR THE EFFICACY OF COGNITVE PAIN MODULATION IN AGING

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A growing number of studies suggest that aging is associated with a decrease in efficacy of cognitive pain modulation. Resting state functional connectivity (rsFC) analysis of the brain offers one way of investigating the potential neural mechanisms that may underly this age-related decline. In this study, 32 young (26.7 ± 4.3 years) and 32 healthy older (68.3 ± 7.1 years) adults underwent a 6-minute resting state fMRI scan, as well as a pain distraction paradigm. In the latter, participants received painful heat stimuli while performing either an easy or a difficult working memory task. We performed region-of-interest (ROI) to ROI rsFC analysis of the imaging data, focusing on regions implicated in pain processing and descending pain control. We then examined the relationship between rsFC parameters and the magnitude of the distraction effect (the reduction in perceived pain intensity during the difficult vs the easy task). Older adults showed reduced connectivity compared to young adults between several descending pain

modulatory regions, including the ACC and PAG, the right secondary somatosensory cortex (SII) and right dorsolateral prefrontal cortex and between the ACC and left amygdala. Importantly, rsFC in older adults correlated positively with the distraction effect, between several regions including the right SI and right amygdala, the left SI and right insula and between the ACC and left amygdala. Our findings thus demonstrate, for the first time, that reduced cognitive pain modulation in older age is directly associated with decreased rsFC within key nodes of the descending pain control network.

Keywords: pain, cognitive pain modulation, aging, functional connectivity, resting state fMRI

Presentation type: Oral presentation / Talk

Session: Pain and Aging

Risk and preventive factors in narrative comprehension.

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Narrative comprehension is essential for societal participation. Further, many global changes in recent years (such as the COVID-19 pandemic, wars, and climate change) can increase the stress level people are exposed to in everyday life and lead, for example, to higher depression rates. In an aging society like Germany (more than 25% of the people are 60 years and older, with an increasing trend), it is of great importance to identify factors that support and impair narrative comprehension. Importantly, aging is related to impaired cognitive functioning and a higher prevalence of depression and chronic pain, as an example. Using longitudinal psychological and clinical data (https://www.trend-studie.de), the present pre-registered study explores preventive and risk factors influencing narrative understanding in elderly people (N = 141, M > 70 years). More specific, physical and mental activity as well as stable social contacts were tested as possible preventive factors for narrative comprehension, and depression, anxiety disorder, chronic pain, poor sleep quality, and stress as risk factors. To assess narrative comprehension, participants were presented with textual and visual narratives with a missing bridging event. Participants were asked to comprehend the stories and to identify (in)correct inferences for the missing event. We examined the influencing factors for narrative comprehension with linear mixed-effect models. Results show that narrative comprehension in elderly people is not influenced by the examined preventive and risk factors. But other important factors should be further considered. The gained understanding of narrative comprehension in aging can help to appropriately address this growing population.

Keywords: narrative comprehension, aging, bridging inferences, depression, chronic pain

Presentation type: Oral presentation / Talk

Session: Text comprehension

Measuring letting go: Assessing self-regulation on an implicit level

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The ability to disengage from unattainable goals is correlated with high life satisfaction and mental health. Models of self-regulation (e.g. Brandtstädter & Renner, 1990; Heckhausen & Schulz, 1993) describe two antagonistic tendencies necessary for flexible goal adjustment: holding on to a goal (goal pursuit) and letting go of it (goal disengagement). The question of how we switch from goal pursuit to disengagement remains a theoretical and empirical challenge. What processes allow us to disengage from a once highly important goal? One hypothesis (Brandtstädter, 2001) is that the switch is initially prepared on an implicit level. A restructuring of goal-related cognitive and emotional associations should result in reduced positive valence and a weakened association with the self for goal-related concepts. The question remains how we can test this hypothesis empirically. We present three indirect measures designed to assess two different aspects (valence of goal associations and strength of association with the self) of implicit goal (dis-)engagement. The following paradigms were used: An evaluative response priming with goal-related and neutral nouns as primes and positive and negative nouns as targets, a semantic priming with goal-related phrases as primes and me- and other-related words and non-words as targets, and a recoding free version of the IAT (IAT-RF, Rothermund et al., 2009) with nouns from two goal-related categories and me- and other-related words as targets. The application and suitability of these three instruments to assess self-regulation processes over time are discussed from a theoretical and experimental point of view.

Keywords: implicit measures, self-regulation, goal disengagement

Presentation type: Poster Presentation

Session: Emotion cognition

Individual differences in language experience affect attention allocation to scene grammar violations during unrelated object searches

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Our visual world is organized based on rules that help us locate and recognize objects (e.g., knowing that a spatula goes neither in a toaster nor a bathroom), known as scene

grammar. Violations to these rules may impair processing as viewers need to resolve ambiguity resulting from the unexpected element of the scene. Grammatical mismatches between objects and scene context have been shown to modulate ongoing eye-movements, even when they are irrelevant to the task at hand. Here, we investigated how sensitivity to scene grammar violations is modulated by individual differences in language experience. Psycholinguistic studies have suggested that bilinguals' constant juggling of multiple languages may help them disengage attention from task-irrelevant, distracting information more effectively. Twenty-one young adults performed a visual search task on scenes containing scene grammar violations while their eye movements were recorded. Targets were either present or absent from the scene, but never part of the violation. Additionally, participants responded to a language background questionnaire. Our preliminary analysis revealed significant interactions between whether the target was present or absent from the scene and second language proficiency on dwell time and number of fixations, with higher L2 proficiency being associated with shorter dwell times and fewer fixations to the scene grammar violation when the target was absent from the scene. These results suggest that knowledge of a second language may be associated with reduced sensitivity to scene grammar violations and a more effective disengagement of attention when the distracting violations are irrelevant to the search task.

Keywords: visual search, attention, eye movements, language, bilingualism

Presentation type: Poster Presentation

Session: Scene perception

Person-Culture Match – but what culture?: Experimentally investigating religiosity as cultural unit

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When people share similar values as their sociocultural context, they are especially happy (person-culture match effect). Previous research conceptualized sociocultural context typically as geographic units (e.g., countries). But is this purely geographic conceptualization appropriate? In the present research, we examine whether a combination of geography and an identity-giving dimension captures the psychologically relevant sociocultural context much better. Thereby, one identity-giving dimension might be particularly consequential for match effects: religiosity. By using an adapted version of the minimal norm pradigm, we experimentally manipulated whether participants' value preferences match or mismatch with the value preferences of a specific sociocultural context (e.g., people in Germany or religious people in Germany). Results showed that religious people are happier when they match with other religious people than when they match with other people in their country (study 1, N=304). Moreover, these match effects became even larger when the sociocultural context is more nuanced defined as a combination of country and people´s denomination (study 2, N = 287). Thus, our research provides first, but promising evidence that shared values with

an identity-relevant group improves people´s well-being and might even act as a social glue that binds people together.

Keywords: person-culture match, well-being, religiosity, social values, identity

Presentation type: Oral presentation / Talk

Session: Social cognition

Exploring intention to participate in energy initiatives through the lens of the agency-communion framework

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Non-profit organizations have been found to score higher on warmth-related traits, while for-profit organizations are rated higher on competence-related traits (Aaker et al., 2015). For energy communities, which aim to generate financial benefits for members but are organized in a collective manner with non-financial impact as main goals, this differentiation has so far not been researched. It is also unclear whether these dimensions predict participation in energy initiatives. This study served as a first step to experimentally test different framings for agency and communion on energy initatives. We conducted a survey (N = 216) using 2 x 2 design, varying energy initiative (energy company, energy community) and attributes (agency, communion), using pictures and description texts. We calculated a unidimensional measure of agency-communion as a difference of agency and communion, with lower scores tending towards communion and higher scores tending towards agency. Participants in the group that learned about energy companies rated them higher in agency compared to those that learned about energy communities (b = 0.309, p = 0.038). Intention to participate in an energy initiative was predicted by a preference towards communion rather than agency (b = -0.261, p = - 0.003). The indirect effect of this mediation was marginally significant (b = -0.081, p = 0.088). Participants also scored agentic images marginally more agentic (b = 0.246, p = 0.098) compared to communion images, but we did not find a significant indirect effect for its mediation for intention to join energy initiatives (b = -0.064, p = 0.149).

Keywords: agency, communion, energy community, framework, intention to participate, energy initiative

Presentation type: Poster Presentation

Session: Health and environment

Relation of methylation of the NR3C1 gene to personality and emotion regulation in Major Depression

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Major Depression is associated with personality factors with strong affective components (neuroticism and extraversion) as well as with the emotion regulation strategies suppression and reappraisal. In addition, studies indicate that patients suffering from depression show altered, usually increased, methylation of the glucocorticoid receptor gene (NR3C1) compared with healthy individuals. The present study investigated the association of personality, particularly neuroticism and extraversion, the emotion regulation strategies suppression and reappraisal and the DNA methylation of NR3C1 with Major Depression. Data from 99 patients diagnosed with Major Depression according to DSM-IV criteria and 99 healthy controls were analyzed. Healthy controls showed lower neuroticism, higher reappraisal as well as higher methylation of NR3C1 than patients suffering from depression – the latter one was found in contrast to previous studies. However, some studies also reported lower methylation in patients suffering from depression compared to healthy controls. The heterogeneous findings could be a consequence of examining different CpG-sites. In healthy controls, neuroticism was negatively correlated with NR3C1 methylation if reappraisal was low and positively correlated with NR3C1 methylation if reappraisal was high. In inpatients, there was neither an association between Neuroticism and NR3C1 methylation nor a moderation of this association as a function of reappraisal. Thus, adaptive emotion regulation strategies could be a resilience factor buffering the impact of negative affectivity on biological alterations of the stress system.

Keywords: depression, NR3C1, methylation, emotion regulation, personality factors

Presentation type: Poster Presentation

Session: Health and environment

Working memory while driving – an experimental approach

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Road crashes remain a major public health issue around the world with an unacceptably high number of people getting killed and injured every day. As previous research has indicated, failures in noticing other critical road users may account for a large proportion of these crashes. Based on a recently proposed ‘saw but forgot’ error, the goal of the present study was to improve the understanding of cases in which a critical traffic participant was initially perceived but forgotten before a critical decision was made due to failures in working memory. To answer the question whether such errors are caused by decay or interference in working memory, an online experiment with 89 participants was conducted that investigated elapsed time and the amount of subsequent information since a situation was perceived. As hypothesized, the participants’ recall accuracy decreased with increasing amount of subsequent information but was

unaffected by elapsed time. These results indicate that 'saw but forgot' errors are caused by interference rather than decay and should therefore become more likely when drivers perceive an increasing amount of new information between the perception of a critical information and a critical decision.

Keywords: Traffic Psychology, situation awareness, working memory

Presentation type: Oral presentation / Talk

Session: Topics of Traffic Psychology

A multiverse analysis of the relationship between decision process model parameters and age

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In the last years, the relationship between age and the parameters estimated in cognitive process models such as the drift-diffusion model has found increasing attention. In the numerous studies published on the subject, there were convergent but also divergent results. Most importantly, the parameters representing decision caution and non-decisional processes often showed very clear linear age-related patterns, while things were more complicated for the parameters representing speed of evidence accumulation. In this research project, we present a systematic multiverse analysis to better understand both the robustness and the heterogeneity found in previous studies. Specifically, we analyse how different cognitive model architectures (standard diffusion model, Levy diffusion model, linear ballistic accumulator model), different tasks studied (18 different cognitive tasks), different estimation procedures (maximum likelihood, Bayesian hierarchical, Bayesian neural-network based), and different data cleaning procedures influence the results found. Our findings thus help us make sense of the underlying dynamics of choices in modeling when utilizing cognitive process models to better understand experimental setups and individual differences.

Keywords: cognitive modeling, diffusion model, multiverse analysis, modeling choices, decision-making, ageing

Presentation type: Oral presentation / Talk

Session: Decision making

A Lévy-Flight Model of Decision Making

Andreas Voß

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Cognitive models of decision-making usually assume a noisy accumulation of evidence until a threshold is reached. The most commonly used model in this class is the Wiener diffusion model. This model assumes that noise in evidence accumulation follows a Gaussian distribution. In this talk, I will propose a similar model of decision making, but one that assumes "heavy-tailed" noise in the evidence accumulation, and thus replaces the diffusion process with a so-called Lévy flight. In this model, the shape of the noise distribution can be modelled by the additional stability parameter alpha. Thereby the diffusion model becomes hierarchically nested within the more general Lévy Flight model. Of particular interest is that the Lévy flight model contains an inherent mechanism to explain fast errors, which are often observed in perceptual decision making. I will present data from different tasks comparing the goodness-of-fit of the new Lévy-Flight model with that of the traditional diffusion model. Possible biases in parameter estimation arising when Lévy-Flight data are analyzed with a diffusion model are discussed.

Keywords: Diffusion Model, Lévy-Flight Model, Decision-Making

Presentation type: Oral presentation / Talk

Session: Cognitive modelling

Aesthetic ratings of homogeneous and heterogeneous sets of stimuli

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Studies in empirical aesthetics vary largely in the kind of stimuli used, and yet they often make general claims about the effects of stimulus factors like complexity on aesthetic attributes like beauty, pleasure and interest. Here, we wanted to investigate how stable these effects are when different stimulus categories are intermingled rather than presented in homogeneous blocks. We selected five main stimulus categories, each time with a rather abstract and a more figurative or recognizable subset: fractals, geometric patterns, natural images, art photography, and paintings. All ten stimulus categories had twenty images, evenly distributed across five levels of objectively computed complexity values. The resulting 200 images were either presented in 10 homogeneous blocks or in 10 heterogenous blocks, to two groups of >200 participants each. All participants rated how beautiful they found these images, and different subgroups also rated pleasure and interest, or order and complexity, all on 7-point Likert scales. Results indicated that the aesthetic measures varied with the preselected five levels of complexity in different ways for the ten stimulus categories and the five scales. Moreover, the effects differed significantly between homogeneous and heterogeneous blocks. In general, complex interactions were obtained between all the variables, which strongly indicates that many effects are not only stimulus-dependent but also context-dependent (strongly affected by the other stimuli included in the set). This study suggests that researchers have to be cautious in drawing general conclusions about

effects of stimulus variables on aesthetic ratings from experiments with limited and homogeneous sets of stimuli.

Keywords: set effects, aesthetics, complexity, patterns, photography, paintings

Presentation type: Oral presentation / Talk

Session: Experimental Aesthetics Following Fechner's Conceptions I

How t(w)o divide a task: Labor division in collaborative visual search

Basil Wahn

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When looking for a certain object or person, individuals often engage in collaborative visual search, i.e., they search together by coordinating their behavior. For instance, when parents are looking for their child on a busy playground, they might search collaboratively by dividing the search area. This type of labor division in collaborative visual search could be beneficial not only in daily life, but also in professional life (e.g., at airport security screening, lifeguarding, or diagnostic radiology). To better understand the mechanisms underlying this type of collaborative behavior, as well as its benefits and costs, researchers have studied visual search scenarios in the laboratory. The aim of this talk is to provide a brief overview of the results of these studies. Are individuals faster if they search together compared to alone? And if so, should they simply search in parallel, or will they benefit from agreeing on a specific labor division? How should they divide the search space, and how to communicate this division? Should a consensus be reached (target present or absent?) before ending the search? In this talk, I address these questions and further key questions, focusing on the aspect of labor division.

Keywords: social cognition, joint action, coordination, collaborative visual search, labor division

Presentation type: Oral presentation / Talk

Session: Cognitive building blocks in social contexts

Arrow as attention guiding technique in augmented reality: Better search efficiency but also more change blindness compared to attention funnel

Svetlana Wähnert, Yuchen Zhang

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When applying augmented reality (AR) in maintenance and assembly, visual search can be performed more efficiently and with less effort using attention guiding techniques (AGTs). However, the focus of attention caused by AGTs could also lead to a failure to recognise obvious changes in the environment, which is referred to as change blindness. In an experiment, six participants wore HoloLens 2 and performed three conditions in a controlled order: search without the help of AGT (baseline), search with arrow as AGT and search with attention funnel (AF) as AGT. In each condition, the trials varied in terms of search angle. In addition, 40% of the trials contained changes of the surrounding virtual objects that participants were required to detect as a secondary task. Search time and change detection were measured. It was hypothesized that AGTs in general, and especially AF, would draw more attention on the search target. This should lead to a reduction in both search time and change detection. The statistical analysis revealed that at small and medium search angles, AF and arrow resulted in significantly faster search times compared to baseline but showed no differences among themselves. At large search angles, only arrow showed an advantage over baseline. In terms of change detection, arrow showed worse results compared to baseline and AF, while baseline and AF did not differ significantly. Contrary to the hypotheses, arrow and not AF led to a reduction in both search time and change detection. Possible reasons for this will be discussed.

Keywords: augmented reality, attention guiding technique, arrow, attention funnel, change blindness

Presentation type: Oral presentation / Talk

Session: Applied attention

Can the Behaviour of Automated Vehicles Serve as a Role Model for Human Drivers?

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At some point in the future, it might be common to see automated vehicles (AVs) driving next to human drivers on public roads – in so-called mixed traffic. One arising question regarding mixed traffic considers the influence AVs 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. This project closes this gap and investigates possible role model effects from AVs to human drivers. A simulator experiment was 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 are keeping after the observation phase. The analysis will investigate the influence of the observed distances on the executed distances. Additionally, the second variable (driving modes) allows to explore whether AVs have a different influence on HD's behaviour than cars driven by other humans.

Keywords: Automated vehicles, automated driving, mixed traffic, imitation learning, social learning theory, role model effects in traffic

Presentation type: Oral presentation / Talk

Session: Automation while driving – current problems and approaches

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Individual Differences in Internal Models Determine Scene Perception

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How does our brain effortlessly and reliably make sense of the visual world despite its complexity? Predictive processing theories posit that visual inputs are compared to internal models of the world. On this view, natural perception is efficient because of our accurate and detailed internal models of the environment. Despite the importance of such internal models, it remains unclear what exactly they contain and how they differ across people. In this study, we used drawing to assess participant-specific, unconstrained descriptions of internal models. In detail, we asked participants to draw typical versions of different natural scenes such as a kitchen or living room. On the group level, the object composition within the drawings was well described by the occurrence frequency of objects in a large set of natural scene photographs, as well as by the objects' conceptual distance to the scene category in a distributional semantics model. However, individual drawings varied substantially between people. To test how these individual differences relate to differences in scene perception, we probed categorization for 3d-rendered scenes. These renders were carefully constructed to match the drawings while controlling for differences in drawing style and ability. In the subsequent categorization tasks, participants were asked to report the category of the briefly presented scene renders. Categorization performance was better for renders designed to be similar to participants' own drawings (and thus their internal models), than to renders based on other people's drawings. This finding suggests that individual differences in internal models explain individual differences in scene perception.

Keywords: individual differences, internal models, visual perception, scene recognition, categorization, prediction

Presentation type: Poster Presentation

Session: Scene perception

Experiences with an automatic emergency call by drivers involved in crashes

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The automatic emergency call (eCall) was developed with the aim of enabling emergency services to be alerted more quickly in the event of a traffic accident. eCall is mandatory for all vehicle models with type approval from April 1, 2018. With the legal required eCall, a connection is automatically established with the nearest public safety answering point (PSAP). Some car manufacturers also offer an advanced service, the so-called private eCall. Hereby, those persons involved in an accident are connected to a call center that informs the PSAP. Thereby, persons benefit from assistance in their own language in almost every country where the service is available. Besides that, additional data can be transferred to improve the overall rescue chain. The Audi Accident Research Unit (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. In this context, detailed, standardized interviews are conducted by telephone with accident participants. One block of questions is specifically dedicated to the experience of the eCall, if triggered. The statements of those involved in the accident were collected and classified using the German school grading system. The feedback received so far (currently n = 59) has been predominantly positive with an average rating of 2. Particular emphasis is placed on the reassuring effect of the private eCall. However, some accident participants are also surprised to suddenly hear a voice in the vehicle that they cannot initially identify.

Keywords: Automatic emergency call, traffic accident, post-accident phase, accident research, rescue chain

Presentation type: Oral presentation / Talk

Session: Automation while driving – current problems and approaches

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Observer-Generated Maps of Diagnostic Facial Features Allow to Categorize Expressions of Emotion

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Objective: Facial expressions of emotion can be reliably categorized into happiness, disgust, anger, sadness, fear and surprise. For each expression, a different set of Action Units (AUs) is assumed to be engaged. We set out to create maps of diagnostic facial features, by analyzing which parts of the face observers highlight as useful. Methods: 202 participants were asked to categorize facial expressions and to highlight diagnostic areas by clicking on them. The faces were show either fully or masked above/below the nostrils. Patterns of highlighted face parts in full faces and the number of correct answers in masked faces were analyzed. Results: When highlighting face parts, observers showed an overall tendency to focus on the eyes and mouth regions. However, the highlighted patterns for each expression deviated from this global pattern in a unique way, revealing maps of diagnostic regions. These observer-generated maps of facial features allowed to accurately predict which expression a participant had seen. When parcellating the maps by AUs, those AUs which are considered most important for expressing an emotion were the ones which received the highest number of clicks. Conclusions: The study confirms the critical role of specific parts of the face for recognizing each emotion. The patterns of diagnostic features which the observers generated by clicking onto the faces allowed for consistent above-chance predictions of the actual expression of the face and included key AUs. These distinct observer-generated patterns can allow to generate ideas about how the task of categorizing facial expressions is performed.

Keywords: Faces, Facial Expressions, Face processing, Face recognition, Categorization

Presentation type: Poster Presentation

Session: Visual attention

On cognitive preconditions of aesthetic experiences

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Aesthetic experiences have been distinguished from other experiences based on an aesthetic mode of processing that often entails concentrating working memory resources on the aesthetic stimulus. Since working memory is a limited-capacity system, there should be a trade-off between available resources and the aesthetic experience. We report six studies that examined the relationship between aesthetic experiences and working memory resources in detail. In Study 1, participants rated the beauty and savoring they experienced from encounters with visual stimuli in a controlled laboratory setting after interruption of a writing task they were engaged in. We found that the participants' aesthetic experiences were hampered by the interruption. In three subsequent field investigations, we showed that work-related rumination (Study 2, N = 329), stress (Study 3, N = 368), and a state of chronic pain (Study 4, N = 322) were inversely related to the savoring that is experienced when exposed to opera, theater, or cabaret pieces. In Study 5, 115 undergraduate students participated in a two-week experience-sampling study and provided a total of 15,047 reports of their aesthetic experiences. Higher working memory loads were associated with fewer aesthetic experiences and reduced savoring of the aesthetic experiences. These findings

highlight the importance of concentrating on aesthetic experiences in order to fully benefit from them. Finally, we report the preliminary results of a laboratory investigation where participants underwent a short mindfulness intervention before rating works of art.

Keywords: aesthetic experience, aesthetic mode, working memory, working memory resources, attention, mindfulness

Presentation type: Oral presentation / Talk

Session: Experimental Aesthetics Following Fechner's Conceptions II

Illusory correlations on the long run: Biased covariation perception even after extended learning

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An illusory correlation (IC) is the erroneous perception of a correlation between two actually uncorrelated categories. Empirically, ICs often result from an overestimation of the frequency of the rarest category combination. Robust ICs are found for short learning periods. Yet little is known about whether ICs persist after extended learning periods. Accounts relying on incomplete learning predict that ICs should disappear after extended learning, whereas accounts based on distinctiveness or information loss predict persisting ICs even after prolonged learning periods. The few existing studies using extended learning paradigms produced conflicting results. While some studies using up to 360 trials indicate that the ICs persists even after long learning periods, other studies showed that the IC might already disappear after 90 trials. In this study, the persistence of illusory correlations was tested by exposing participants to a total of 1500 stimuli. One of two visual symbols (frequent or rare symbol; ratio 2:1) was presented concurrently with one of two auditory signals (frequent or rare tone; ratio: 4:1). Across all trials, the symbols were perfectly uncorrelated with the signal. After extended learning, participants overestimated the frequency of the combination rare symbol paired with rare tone relative to the frequency of the combination frequent symbol paired with rare tone indicating the presence of an IC. This shows that IC persist well beyond the trial numbers typically investigated in IC research. In addition, the results are not compatible with incomplete learning accounts, but are consistent with accounts based on distinctiveness or information loss.

Keywords: illusory correlation, incomplete learning, distinctiveness, information loss

Presentation type: Poster Presentation

Session: Memory and working memory

In a Cognitive Environment, How Do We Choose How to Think?

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When humans solve problems, they can frequently rely on a multitude of cognitive mechanisms. For example, arithmetic operations can be implemented mentally, with fingers, a calculator, or with pen and paper. But how do humans decide which mechanism to use? Here, first, we will introduce well-known reasons from previous cognitive science research: most prominently, actual and believed performance of the available mechanisms. We then move on to some of our recent research targeting perseveration behavior. Why do many individuals prefer sticking with one mechanism rather than mixing several mechanisms? Multiple reasons are conceivable. First, avoiding effort might lead to switch avoidance on the one hand and avoidance of mental mechanisms on the other hand. Second, and contrarily, participants might seek mental challenges and prefer mental mechanisms. Third, bindings between similar stimuli and specific mechanisms might develop over time, which would favor repetition of a specific mechanism via retrieval of a stimulus-mechanism-binding. Fourth, participants might satisfice and stick with a good enough mechanism that allows avoiding excessive performance monitoring of the available mechanisms. In the presented research, participants engaged in an object comparison task that could be solved via one of two mechanisms: mental or manual rotation. Interestingly, and in contrast to the four reasons introduced before, perseveration was found to be mostly due to actual and somewhat due to believed performance differences between mechanisms. With few exceptions, perseveration might thus be caused by the usual suspects: actual and believed performances of available cognitive mechanisms.

Keywords: Cognitive strategy selection, cognitive offloading, problem solving, task switching, perseveration

Presentation type: Oral presentation / Talk

Session: Action-perception interaction

The Role of Self-Compassion and Personal Conflict Resolution Styles in Parenting Stress.

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The personality characteristic self-compassion entails being kind and understanding towards oneself and seems to be an important resource especially when faced with experiences of suffering or personal failure. The present study investigates the relation between self-compassion and parenting stress within the first years of parenthood. Since previous studies suggest that not only the experience of stress, but also the

frequency of conflicts in romantic relationships increases in the transition to parenthood, the present study aims to test the hypothesis that the conflict resolution style mediates the association between self-compassion and parenting stress. 169 mothers and 55 fathers of only one child up to the age of 4 responded to a questionnaire that assessed self-compassion (SCS, Self-Compassion-Scale), conflict resolution styles (CRSI, Conflict Resolution Style Inventory) and parenting stress (PSI, Parenting Stress Index). The results indicate that parents with higher levels of self-compassion report more functional conflict resolution styles and less parenting stress than those with lower levels of self-compassion. Additionally the results suggest that the association between self-compassion and parenting stress amongst mothers is partially mediated by conflict engagement. The present findings underline the relevance of self-compassion for well-being in romantic relationships and parenthood.

Keywords: self-compassion, conflict resolution styles, parenting stress

Presentation type: Poster Presentation

Session: Moral decisions and social interaction

Can monetary incentives overturn fairness-based decisions?

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Fairness norms and resulting behaviors are an important prerequisite for cooperation in human societies. At the same time, financial incentives are commonly used to motivate social behaviors, yet it remains unclear how financial incentives affect fairness-based behaviors. Combining a decision paradigm from behavioral economics with hierarchical drift-diffusion modeling, we investigate in this registered report (https://osf.io/bgka8/) the effect of different financial incentives on two types of fairness-based decisions in four experimental groups. Two groups of participants divide points between themselves and a disadvantaged person, inciting fairness-based compensation behavior and two other groups of participants divide points between themselves and a fairness violator, inciting fairness-based punishment behavior. In addition, each group will either receive financial incentives that are aligned or in conflict with the respective fairness-based behavior. This design allows us to directly investigate how different incentives shape the cognitive mechanism of fairness-based decisions and whether these effects are comparable across different fairness domains (punishment-based vs compensation-based fairness). Besides specifying how the interaction between financial incentives and fairness affect the computation of social decisions, the findings will clarify the conditions under which incentives undermine and enhance fairness and are thus potentially relevant for

developing incentive schemes. Results will be ready to be presented at the conference as data collection is nearly completed.

Keywords: fairness, financial incentives, punishment, compensation, drift-diffusion modelling

Presentation type: Poster Presentation

Session: Moral decisions and social interaction

Offline-Judgments of Learning: Comparison of Notetaking and Retrieval Practice by Teachers and Students

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Offline-Judgements of Learning (off-JOLs) – in contrast to Judgments of Learning (JOLs) usually assessed after learning – are metacognitive assessments, which are independent of the immediate experience of the current learning situation. Such an assessment decoupled from the current experience of learning activities should be routed more in theory-based (abstract) conceptions of learning activities, learning materials, and memory. Experiment 1 shows greater accuracy in students' metacognitive judgements for long-term retention benefits (btw-sbj.: immediate, 1-week, 2-weeks) of testing compared to rereading (within-sbj.) when assessed with off-JOLs rather than JOLs, reflecting actual learning outcomes for testing. Off-JOLs did not show an overestimation of rereading's effectiveness over testing. Thus, JOLs are biased by a negative feedback effect of testing stemming from the experience of the learning situation (e.g., revealing knowledge gaps). Experiment 2 tested whether learners and teachers also showed more accurate metacognitions for other learning activities when removing the experience-bias. In a 2x3x3 mixed design, the present experiment investigated off-JOLs for testing compared to note-taking (within-subjects), whereby students judged the effectivity for themselves and others, whereas teachers only judged the effectivity of the learning activities for others. Additionally, participants were presented with different final test delays. Both teachers and students alike, overestimated the long-term benefits (recall after 1 or 2 weeks) of note-taking as learning tool relative to testing. Learners may know more than we so far thought, but they still err regarding effectivity judgments of other activities (like notetaking) depending on their subjective theories about learning conditions and memory over time.

Keywords: metacogntion, JOLs, off-JOLs, teachers, students

Presentation type: Oral presentation / Talk

Session: Benefits of Practice Tests on Learning

Illusions of control: The impact of intention and outcome valence on the outcome density bias

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Humans experience themselves as causing events in the outside world when these events follow their actions in a contingent and contiguous manner. Sometimes, they even experience control over the consequences of action when actual control is missing. One such illusion of control is the outcome density bias: Participants often judge to have more control over non-contingent action outcomes when the overall frequency of outcomes is high rather than low. Blanco and Matute (2015; doi: 10.1027/1618-3169/a000280) demonstrated that the density bias depends on participants' instructed intention to either produce an outcome associated with a monetary reward, or to prevent an outcome associated with a monetary punishment. Our study extends the Blanco and Matute (2015) findings by showing that valence of outcomes (laughing vs. frowning smileys) and intention (i.e., the instruction to learn to prevent or to produce outcomes by pressing a key, irrespective of valence) both affect the density bias: More subjective control over frequent outcomes was only observed for positive events and for produce instructions. For prevent intentions and negative outcomes the density bias was reversed.

Keywords: causal learning, sense of agency, control

Presentation type: Poster Presentation

Session: Stimulus-response and response-effect binding

Visual illusions in honeybees: the Ebbinghaus-Illusion

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Visual illusions are both fascinating and useful for understanding the sensory and cognitive processes involved in perception. Interspecies comparisons of perceptual illusions, in particular, are interesting because they allow insight into the evolution of visual strategies. Here we investigate the Ebbinghaus illusion, a size illusion, which is well know in human perception: a central dot appears larger/smaller when surrounded by smaller/larger dots (see Fig. 1). It is thought to result from computing the size of an object in relation to it's surrounding, a crucial step towards size constancy. Previous studies found that bees use the optic flow field in order to analyse an objects 3D shape[1]. But what kind of strategy do bees use for the computation of object size? And do bees posses concepts like "smaller" and "larger" ? The existence of the Ebbinghaus Illusion in honeybee vision was tested in a serious of behavior experiments. Our results show that (1) bees can learn and use the concept of "smaller" and larger"; (2) the bees size perception is indeed fooled by the Ebbinghaus arrangement. We conclude that bees

compute the relative, and not the absolute size of objects, whereby the underlying neuronal computations take into account the relations to other objects in the surrounding, ultimately enabling size constancy. References: Werner,A., Stürzl, W., Zanker, J. (2016). Object Recognition in Flight: How Do Bees Distinguish between 3D Shapes? PLoS ONE 11(2): e0147106.

Keywords: visual illusion - size perception - Ebbinghaus - honeybee - evolution

Presentation type: Oral presentation / Talk

Session: Aesthetics and perception

Pedestrians' erroneous time-to-collision estimation for accelerating vehicles: Evaluating potential countermeasures

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When judging the time-to-collision (TTC) of visually presented accelerating vehicles, pedestrians do not adequately consider the acceleration and commit systematic estimation errors (first-order pattern, resulting in TTC overestimation), which represents a potential risk. These estimation errors are largely removed when the sound of conventional (but not electric) vehicles is presented. We investigated whether a visual acceleration signal (Exp 1.) or trial-by-trial feedback about the estimation accuracy (Exp. 2) can improve visual-only TTC estimation for accelerating vehicles and thus can reconcile pedestrian safety and noise reduction. In a VR traffic simulation showing a pedestrian's perspective at the curb, participants estimated the TTC for constant-velocity and accelerated vehicle approaches. In half of the blocks in Exp. 1 (n = 26), a light band on the windshield illuminated whenever the vehicle accelerated but remained deactivated at constant speeds. In the other blocks, the light band never illuminated. Without acceleration signal, we observed the expected erroneous, first-order pattern in TTC estimation for accelerated approaches. With acceleration signal, the first-order pattern was reduced. Exp. 2 (n = 20) included 3 blocks, of which only the second provided trial-by-trial feedback about the TTC estimation accuracy. Although participants adjusted their estimations during/after the feedback, in each block, the estimations for accelerated approaches showed a consistent first-order pattern. This suggests that the feedback did not help participants in considering the acceleration. Overall, a binary visual acceleration signal rather than training with feedback could be a potential countermeasure against pedestrians' erroneous TTC estimation for silent accelerating vehicles.

Keywords: time-to-collision estimation, pedestrian, acceleration, traffic safety

Presentation type: Oral presentation / Talk

Session: Topics of Traffic Psychology

It's written all over your face: Facial Trustworthiness in distributive online-negotiations

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Humans quickly and automatically infer traits from the facial features of others. Past research showed that these automatic inferences can affect social decision-making. Although trustworthiness and dominance perceptions in general have been shown to impact negotiation processes and outcomes, it remains an open question whether facial features related to these dimensions impact negotiations. In the current study, we hypothesized that negotiators with a high vs. low facial trustworthiness lead the negotiation opposite to propose counteroffers which are closer to the initial offer anchor (higher anchoring susceptibility), while those with high vs. low facial dominance lead the negotiation opposite to propose counteroffers which are further away from the initial offer anchor (lower anchoring susceptibility). In an online market experiment, N = 140 participants negotiated the price of 32 different products which were presented together with pictures of sellers' high vs. low trustworthy and high vs. low dominant faces. Faces with high vs. low trustworthiness indeed led to a higher anchoring susceptibility, while high vs. low dominant faces led to lower anchoring susceptibility. Exploratory analyses showed that backlash effects for stereotypically incongruent faces (trustworthy males and dominant females) did not emerge on the price offer but on perceptions of the seller. The results show that even subtle cues from facial features can affect robust effects like anchoring in distributive online price negotiations.

Keywords: face perception, trustworthiness, dominance, negotiation, anchoring

Presentation type: Oral presentation / Talk

Session: Emotional faces in social cognition: New approaches and recent insights

Response inhibition for the basketball jump shot: Using the "stop before eight" paradigm

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Inhibitory control of actions is an executive process, which is important to attain behavioural goals. A defending basketball player, for example, who wants to block a jump shot, needs to inhibit the defensive action if the opponent only pretends to shoot. To investigate the ability of response inhibition in such a one-on-one situation in basketball, a computer-based anticipation experiment was conducted. In three blocks of 200 trails each, participants (N = 27, 11 females and 16 males, Mage = 22,26) viewed

a video of a basketball jump shot (face-to-face, front view perspective) and were instructed to release the spacebar precisely at the point, where the ball leaves the fingertips of the basketball player (go-trials). In 25% of the trials, the video stopped prematurely before ball release, and participants were asked to withhold their response (stop-trials). The delay between the stop and the point of ball release was adjusted by a staircase tracking algorithm with a fixed step size, based on participants' performance. For go-trials, results showed a constant error of 23 ms. For stop-trials, participants could only inhibit 50% of their responses when the video stopped between 183-200 ms before the point of ball release. Furthermore, a post-stop-trial adjustment (i.e., larger constant error) both, after successful and after unsuccessful stop-trials was found. Anticipation performance benefited from practice across the three blocks. Further experiments should investigate response inhibition in basketball using more realistic response actions.

Keywords: response inhibition, basketball, deceptive actions, anticipation, motor control

Presentation type: Oral presentation / Talk

Session: Perception and Action in Sports

Interplay of Object and Global Scene Information During Scene Categorization

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We can quickly categorize scenes into different classes, an ability that has been previously related to usage of both object information and global scene properties. Here we compared the utility of both sources of information and assessed the time course of information usage by reducing real-world scene images to either single objects or visualizations of global scene information (textures). In Experiment 1, using a 16AFC scene categorization task, we showed that object information was on average more useful than global scene information, and that combining both types of information (i.e., a single object in full resolution with a scene texture background) was not sufficient to explain fast scene categorization. In Experiment 2, we created inconsistent object-texture combinations using an object from one scene category and a texture from another, thus forcing participants to choose between the scene category conveyed by object vs. global scene information in a 2AFC task. In line with Experiment 1, we found a small but significant bias to choose the scene category conveyed by the single object over the category conveyed by global scene information. Surprisingly, however, this tendency decreased with longer SOAs between stimulus and mask, implying that participants increasingly based their categorization on global scene information when longer processing times were granted. Both these findings are inconsistent with the proposal of a default global-to-local processing sequence of scene information and could be interpreted as suggesting more flexible information usage during fast scene categorization. We discuss several alternative explanations and control experiments for our findings.

Keywords: scene categorization, objects, global scene information, textures, time course, global-to-local processing

Presentation type: Poster Presentation

Session: Scene perception

Resting-state functional connectivity predictors of subjective visual Gestalt experience

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Subjective perceptual experience is influenced not only by bottom-up sensory information and experience-based top-down processes, but also by an individual's current brain state [1]. Specifically, our previous study [2] found increased prestimulus insula and intraparietal sulcus (IPS) activity before participants perceived an illusory Gestalt (global) compared to the non-illusory (local) interpretation in a bistable stimulus. That study provided only a snapshot of the prestimulus brain state that favors an illusory interpretation. In the current study, we tested the hypothesis that the neural machinery that biases perception towards the illusory interpretation immediately before the stimulus onset, is also predictive of an individual's general tendency to perceive it, which remains stable over time. We examined individual differences in task-free functional connectivity of the insula and the IPS and related it to differences in the individuals' duration of the two interpretations. We found stronger connectivity of the IPS with areas of the default mode network and with extrastriate areas to predict shorter local perceptual phases, i.e., a faster switch to an illusory percept, but no equivalent results for the insula. Our fundings suggest that the subjective experience of an external stimulus results from integrating sensory representations of the visual cortex and abstract representations of the default mode network, which is accomplished by the IPS.

Keywords: bistable illusion, fMRI, functional connectivity, resting-state networks, subjective perception

Presentation type: Poster Presentation

Session: Visual attention

The neurophysiology of continuous action monitoring

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The monitoring of one's actions is essential for goal-directed behaviour. The underlying neural mechanisms are not well-understood, because ecological situations require continuous monitoring of actions, which has not been in the focus of research in the field. We delineate the neurophysiological principles of continuous action monitoring and show that superior parietal and frontal cortices play distinct functional roles in it. Parietal cortices are central for initial resource allocation processes and also for the oscillatory dynamics during pursuit tracking. In particular, beta band activity is essential, likely reflecting maintenance of sensorimotor programs maintenance and their adjustment. Theta and alpha bands support these processes through attentional sampling and gating of information, respectively. Crucially, the function and importance of these activities changes depending on the period during tracking. Processes reflected by alpha and beta band activity are mostly relevant during the initial period of tracking in which sensorimotor calibrations are particularly intense. Theta band activity is relevant during all periods, but shifts from parietal cortices in the initial tracking period to frontal cortices in later tracking periods, likely reflecting a shift in the functional relevance from intensified attentional sampling to intermittent performance monitoring processes. The study closes a critical gap in knowledge on how neural processes subserve continuous action monitoring, which has emerged through the predominant reliance on experimental approaches imposing short-lasting and regularly re-instating monitoring demands.

Keywords: performance monitoring, theta, alpha, beta, EEG, parietal cortex, superior frontal cortex

Presentation type: Poster Presentation

Session: Motor and action control

Attempted Retrieval Can Improve Learning by Facilitating Prior Knowledge-Based Personalization

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Retrieval practice promotes learning. In typical retrieval practice, learners first encountering a new study item are given the expected answer along with the cue (an initial passive study trial). Withholding the answer by giving only the cue (an initial attempted retrieval trial) creates an additional retrieval opportunity. In contrast to earlier lab studies, we examine whether initial attempted retrieval promotes learning in realistic situations, where (a) learners can be expected to have varying degrees of prior knowledge of the study materials; (b) items are repeated multiple times; and (c) learners receive continuous feedback. In four experiments (N = 210), we contrast conditions with initial attempted retrieval to initial passive study in a multiple-repetition retrieval practice session. In the first two experiments, we demonstrate that initial attempted retrieval results in higher retrieval accuracy and faster response latencies on subsequent

repetitions, regardless of the success of the initial retrieval attempt. However, after multiple repetitions of an item, benefits of initial attempted retrieval diminish, calling into question their practical usefulness. In the remaining two experiments, we show that initial attempted retrieval is beneficial in multiple-repetition learning when the attempted retrieval trials are used to identify prior-knowledge levels in adaptive learning applications. Dropping items that were answered correctly on the first attempt enhanced overall learning efficiency, especially for learners with moderate to high prior knowledge, but without any disadvantage for learners with low prior knowledge. These results demonstrate under which conditions the attempted retrieval benefit can improve learning outcomes in the classroom.

Keywords: Attempted retrieval, Adaptive learning, Retrieval practice, Test-enhanced Learning, Prior Knowledge.

Presentation type: Oral presentation / Talk

Session: Learning and encoding

Implicit learning is based on abstract features: A color sequence transfers to a location sequence

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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 take place in distributed sets of encapsulated, specialized, and parallel working modules. However, it is not clear yet what exactly is processed in these modules. Do modules either process purely perceptual or motoric information or do they process distinct features regardless of whether they belong to perception- or action-related processing? One way to study the building blocks of implicit learning is to analyze the conditions for learning transfer from one domain to another. According to modularized theories, the encapsulated modules might not exchange their sequence knowledge which would render learning transfer impossible. However, based on the Theory of Event Coding, we argue that learning transfer might occur if the task set enables a binding between two features in an event file. In an experiment with four conditions, we tested whether learning is neither purely perceptual nor motoric, but abstract and even transferrable. The participants were able to transfer a perceptual color sequence to a spatial location sequence. However, learning transfer occurred only when the participants bound the colors to specific locations in event files prior to training. Interestingly, this held true when colors shared a spatial arrangement with locations in terms of their brightness, and even when colors and locations were arbitrarily bound. Hence, our study concludes that features are the building blocks of implicit learning.

Keywords: implicit learning, learning transfer, features, consciousness

Presentation type: Poster Presentation

Session: Motor and action control

Can mindfulness interventions impact the explicit and implicit attitudes toward vegetarian foods?

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Objectives: The main goal of our intervention study was to investigate whether two conceptually different mindfulness interventions positively impacted the explicit and implicit affective evaluations of vegetarian foods. We included possible mediating variables (e.g., wellbeing) and related our results to the stage model of self-regulated behavioral change (SSBC). Methods: We implemented a compassion and caring-based mental training (N = 31) and an adapted MBSR course (N = 31) as mindfulness interventions, and a stress-reduction course (N = 26) as the active control group. The curriculums consisted of twelve weekly group sessions á 75 minutes. All participants were tested pre- and post-intervention and three months after the last intervention session, answered questionnaires (mindfulness, compassion, wellbeing, items of the SSBC) and completed an explicit affective evaluation task and an affective priming task. Results: There was an improvement in the explicit attitudes toward vegetarian foods regardless of the intervention group. In the SSBC, we found a link between the explicit attitudes toward vegetarian foods and the indicated stage in the model. Multiple regression analysis revealed social and personal norms and a vegetarian/vegan diet as the only significant predictors for goal intention in the SSBC. Conclusion: The results of our study suggest that mindfulness interventions, as well as a stress-reduction program, have a positive impact on explicit affective attitudes toward vegetarian foods. We highlight the meaning of inner dimensions and transformation for change processes for a more sustainable diet and the role of social and personal norms.

Keywords: mindfulness, sustainability, sustainable food consumption, affective attitudes, model of behavioral change, intervention study

Presentation type: Poster Presentation

Session: Health and environment

Acoustics versus articulation: What is sound symbolism based on?

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Sound symbolism refers to the association of phonemes with non-speech phenomena, such as when /i/ is small (Sapir, 1929), or when “bouba” sounds rounder than “kiki” (Ćwiek et al., 2022). These associations have been shown to matter in language

acquisition and processing (Kita & Imai, 2014; Lockwood & Dingemanse, 2015). A so-far inconclusive debate surrounds the psychological mechanism that underpins sound symbolism, specifically whether articulation or acoustics lie at the root of such mappings (e.g., Eberhardt, 1940; Johansson & Zlatev, 2013; Newman, 1933; Sapir, 1929). Recent proposals emphasize articulatory mechanisms (Thompson & Do, 2019; Vainio et al., 2019). In this talk, I will argue that the search for a monolithic locus of sound symbolism is futile, not only because acoustics and articulation are tightly coupled and hard to orthogonalize experimentally, but also because we already know from the existing experimental literature that different sound symbolic phenomena are supported by different mechanisms. Moreover, the same sound symbolic can actually be supported by multiple different mechanisms. I conclude with a call to move beyond the articulation versus acoustics debate in discussing sound symbolic mechanisms. Instead, emphasis should shift to considering networks of phonetic cues, both articulatory and acoustic in nature.

Keywords: sound symbolism; acoustics; articulation; speech processing

Presentation type: Oral presentation / Talk

Session: Sound Symbolism: Phenomena, Methods, and Psychological Processes

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Preconditions for modality compatibility effects

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Input-output modality compatibility denotes the idea that some combinations of stimulus- and response-modality lead to superior performance (modality compatible mappings, e.g., visual-manual; auditory-vocal) compared to other combinations (modality incompatible mappings, e.g., visual-vocal; auditory-manual). However, the preconditions under which these effects arise remain largely elusive. Therefore, we tested for modality compatibility effects in blocks in which either the stimulus-modality, or the response-modality, or both could vary. We found modality compatibility effects only when both varied, i.e., when several stimulus- and response-modalities were mixed within the same block. These results confirm a necessary and concrete precondition for modality compatibility effects that let us further specify the cognitive mechanisms underlying these effects.

Keywords: cognitive control, modality, action control

Presentation type: Oral presentation / Talk

Session: Action-perception interaction

The effect of horizontal camera position on time-to-contact estimation when using a camera-monitor system

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As mirrors in the automobile are increasingly replaced by camera-monitor systems, it is important to understand the potential consequences of different camera placements. Uncommon camera positions offer potential advantages such as a different or larger field of view. However, decoupling the visual axes may lead to altered perception. Previous findings indicate that if the camera's position is changed vertically, distance is overestimated for higher and underestimated for lower camera positions, as compared to the standard position of the driver-side mirror. It is, however, unclear which effect the change of the camera position in horizontal direction has on time-to-contact estimation. Therefore, we conducted a study with a prediction motion paradigm in which subjects had to estimate the time-to-contact of a vehicle approaching from behind. In addition to the camera position and the actual time-to-contact, the speed of the approaching vehicle and the rear visibility of the own vehicle were varied. The results of the currently ongoing study as well as its implications for the design of camera-monitor systems will be reported.

Keywords: camera-monitor system, time-to-contact

Presentation type: Oral presentation / Talk

Session: Experimental Engineering Psychology

Intergroup bias in more or less diverse populations

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People like and trust their ingroups more than outgroups - that is, people show an intergroup bias. In a diversifying society, the number of outgroups that people encounter increases. People's intergroup bias combined with a higher number of outgroups in society might result in decreased overall population trustworthiness. In five experiments (N_{total} = 1.489) using a minimal group paradigm, we did not find the expected decrease in overall population trustworthiness in more (vs. less) diverse populations. However, we found a robust asymmetry in people's intergroup bias, leading to equally high overall population trustworthiness. In populations of high and low diversity, people perceived their ingroup to be more trustworthy than outgroups. This effect was stronger in a population of high diversity driven by the particularly high perceived trustworthiness of the ingroup. We demonstrate that this asymmetry is not driven by the actual or perceived size of ingroups and outgroups or the subjective experience of group size in the experimental design. Rather, in a highly diverse population, it appears that higher perceived similarity between people and the ingroup explains the increase in perceived

trustworthiness of the ingroup and, thus, the asymmetric intergroup bias that overshadows differences in overall population trustworthiness.

Keywords: intergroup bias, diversity, trust, ingroup, outgroup

Presentation type: Oral presentation / Talk

Session: Social cognition

Reshaping priming effects through response-deadline variation

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The method of response priming is a useful paradigm to investigate response-conflict on a visuo-motor level. The classical response paradigm demands participants to respond as quickly and as accurately as possible to a target stimulus preceded by a prime. The prime and the target can either be mapped to the same response (consistent) or to a different response (inconsistent). This usually leads to large priming effects in response times and error rates that increase with the stimulus-onset asynchrony (SOA) between prime and target. Previous studies of response times, pointing movements, and other measures indicate that the effect is based on prime-triggered response activation that is time-locked to prime onset and invariant with SOA. In this study, we impose different response-deadlines to accomplish three goals: 1) to alter the speed-accuracy tradeoff to move effects from RT to error rate or vice versa; 2) to reduce the variance in the respective dependent measure to increase power and precision. Analyzing the response time distributions by event-history analysis further allows us to trace the occurrence of priming effects over time. This way, we can 3) determine whether the onset of response priming effects in the distribution remains invariant when the response deadline is altered. We will report extensive data from eight participant based on >100 trials per condition and participant. We expect to see increasing priming effects in error rates as response deadlines are shortened, as well as decreased variance in response time effects.

Keywords: priming, speed-accuracy tradeoff, vision, perception, distributional analysis

Presentation type: Oral presentation / Talk

Session: Basic attention

Strength differences between dominant and non-dominant hand are related to a compatibility effect between stimulus size and left/right responses

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The term SSARC (spatial-size association of response codes) effect refers to faster left-hand responses to physically smaller stimuli and faster right-hand responses to physically larger stimuli, as compared to the reverse conditions. This compatibility effect suggests an overlap between cognitive representations of physical size and space. We report an experiment in which we test a hypothesis about the origin of the SSARC effect. We started from the fact that the dominant hand is often stronger than the non-dominant hand. Hence, we reasoned that the SSARC effect might be a consequence of the habit to grasp larger (and heavier) objects with the dominant hand, but smaller (and lighter) objects with the non-dominant hand. Our experiment with 80 right-handed and 80 left-handed participants consisted of two parts. In part one, we measured the forces of left and right fingers, hands, and arms, respectively, for each participant. In part two, participants faced a choice-response task, in which they pressed a left or right key to a small or large stimulus. The S-R mapping (small-left / large-right or small-right / large-left) varied within participants. There were three major results. Firstly, the dominant effector was stronger than the non-dominant effector. Secondly, the SSARC effect was stronger in right-handers than in left-handers. Thirdly, individual strength differences between dominant and non-dominant effectors were correlated with the size of the individual SSARC effect. Our results support the hypothesis that strength differences between the dominant and the non-dominant hand may have contributed to the origin of the SSARC effect.

Keywords: compatibility, handedness, strength, stimulus size, response location

Presentation type: Oral presentation / Talk

Session: Cross-dimensional compatibility effects between quantities, valence and space: Points of convergence and points of divergence

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Item Embeddings Clarify the Structure of Personality

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The psychological sciences have been limited by the lack of conceptual clarity and a common taxonomy of psychological constructs and measures. We show that item embeddings (i.e., representations of psychometric items in a vector space obtained from natural language processing methods) can help deal with this problem by quantifying both empirical and conceptual overlap between measures and providing a common conceptual representation. Specifically, we analyse 459 psychological measures consisting of more than 4000 items to show that item embeddings can predict observed empirical correlations between measures, identify jingle-jangle fallacies, and suggest a novel taxonomy of personality constructs. All in all, our work suggests that item embeddings offer a powerful tool to address the incommensurability problem in the psychological sciences.

Keywords: personality, conceptual clutter, sentence embeddings, machine learning

Presentation type: Oral presentation / Talk

Session: Replicability

Dual-task performance in young and older hearing-impaired adults during overground walking

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Older adults with Hearing impairment show reduced walking performance under Dual-task (DT) conditions. This study investigates the neural correlates of DT performance while walking in this target group compared to healthy controls or younger adults. The Mobile Brain/Body Imaging approach (MoBI) allows for parallel analysis of performance, biomechanical and neuronal measures. The joint analysis helps to understand the brain dynamics underlying the interaction of cognitive and motor processes during different DT conditions (visual and auditory) controlling for age. In a cross-sectional study, three groups will be compared by age (younger vs older adults) and by hearing impairment (mild vs not hearing impaired). Within-subject, the task complexity (single- vs DT) and cognitive task modality (visual vs auditory) will be contrasted. Dual task costs and their underlying neuronal correlates will be analyzed focusing either on gait or cognitive performance. So far, the data of 22 young and 5 older participants was recorded. Data recording is ongoing and aims for a sample size of 96 (48 healthy & 48 mildly hearing impaired) community-dwelling older adults (50-70 years) and 48 younger adults (20-30 years). The performance data shows already clear dual-task costs for the young participants in both modalities. Until the presentation the data recording will be also informative for the older participants. The results will provide insight into cognitive-motor interference (CMI) and the underlying processes of the interaction between motor and cognitive tasks. We hypothesize that performance differences are associated with different cognitive-motor processes, i.e., stimulus intake, resource allocation, and movement execution.

Keywords: Hearing impairment, MoBI, Dual-task, Overground walking, Older adults

Presentation type: Poster Presentation

Session: Auditory processing

Learning the environment vLearning the environment by using navigation assistance

Anna Wunderlich, Klaus Gramann

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Navigation assistance systems are increasingly used as support for spatial orientation when navigating through the environment. The main benefit is reduced task load of the user as they provide turn-by-turn navigation instructions. This enhances safe navigation in a dynamic and safety critical surrounding. However, automated navigation assistance systems diminish the processing of the surrounding environment which accelerates the decline of spatial orienting abilities. The talk presents several studies investigating incidental spatial knowledge acquisition when using auditory navigation instructions incorporating references to salient objects in the environment. The knowledge about those landmarks and their locations helps to build a mental representation of the environment. The results of five experiments consistently showed improved landmark and route knowledge when using landmark-based navigation instructions as compared to standard GPS guidance. This effect was robust when testing the paradigm in simulated driving and during pedestrian navigation through the real world. Further the effect was independent of individual spatial abilities and was still present several weeks later. Even though incidental learning was triggered, landmark-based navigation instructions did not significantly increase subjective mental load during assisted navigation. Mobile EEG recordings allowed for the analysis of brain activity during assisted navigation in the real world. A frontal component of the blink-related potentials indicated increased engagement with the environment when using landmark-based navigation instructions. Integrating landmark references in auditory navigation instructions is a simple, but powerful way to initiate processing of the environment and, hence, provide a learning-oriented navigation assistant which can preserve the users' spatial abilities.

Keywords: assisted navigation, spatial learning, landmarks, mobile EEG, blink-related potentials

Presentation type: Oral presentation / Talk

Session: Spatial Navigation

Transcutaneous vagus nerve stimulation in humans induces pupil dilation and attenuates alpha oscillations: a replication study

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Transcutaneous vagus nerve stimulation (tVNS) has emerged as a promising brain stimulation method for the treatment of various neurological and psychiatric conditions such as pharmaco-resistant epilepsy and depression. As a non-invasive alternative to vagus nerve stimulation, its clinical efficacy is hypothesized to work via modulations of the locus-coeruleus/noradrenaline neuromodulation system. Although some experimental studies suggest tVNS-induced changes in physiological and behavioral markers related to noradrenergic activity, robust and consistent findings are necessary to deepen our understanding of its working principles. The goal of the present study is

to further elucidate the mechanistic underpinnings, by replicating a recent study which showed a direct relationship between tVNS stimulation and noradrenergic biomarkers, namely pupil dilation and electroencephalography (EEG) alpha oscillations. Using short bursts (3.4 s), the previous study found that pupil size increased and alpha power decreased for tVNS compared to sham stimulation. On the one hand, we show increased pupil size following the onset of tVNS stimulation compared to sham stimulation, replicating the recently published findings. On the other hand, we did not observe an attenuation of alpha oscillations for tVNS compared to sham but rather an overall increase in alpha power irrespective of condition, conflicting with previous findings. These inconsistent results put into question the underlying mechanisms for the efficacy of tVNS on locus-coeruleus/noradrenaline neuromodulation. We provide an in-depth discussion of the possible reasons for the partially reproducible findings.

Keywords: replication, transcutaneous vagus nerve stimulation, noradrenaline, pupillometry, EEG

Presentation type: Poster Presentation

Session: Health and environment

Contextual modulation of task switching in forced and free-choice paradigms

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Successful adaptive behaviors require us to use appropriate levels of cognitive control according to environmental needs. While the decision to engage more control is often ascribed to a strategic resource-intensive executive process, people may also simply use surrounding environmental features to trigger different levels of cognitive control instead. However, there is currently little evidence for such environment-specific triggering of cognitive control. Therefore, we used a forced task-switching paradigm (Study 1) and a free-choice Wisconsin card sorting task (Study 2) to investigate the environment-specific modulation of cognitive control. In both studies, participants were exposed to two environments with different control needs: task-switching frequency in Study 1 and rule volatility in Study 2. The impact of environment was tested in a subsequent, uninstructed probe phase, where the actual task switching frequency or rule volatility was again equal in both environments, after either one or four days of training. The results showed that, after four days' training, but not after one, participants showed an environment-specific triggering of cognitive control in both studies. Specifically, participants showed a reduced switch cost in the environment that triggered a high need for control in Study 1, and higher learning rates in the environment that indicated a high rule volatility, especially after receiving negative feedback in Study 2. Taken together, these results provided important evidence for the idea that the modulation of cognitive control in both forced and free choice behavior can rely on associative learning, providing an environmental triggering mechanism for cognitive control.

Keywords: cognitive control, context, task switching, reinforcement learning

Presentation type: Oral presentation / Talk

Session: Current directions in free-choice paradigms I: What we can learn from giving more control to the participant

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A closer look at the agent advantage effect: agent benefit or patient cost?

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When people see a dog bite a man, they will focus on the dog (i.e., the agent performing the action) first and the man (i.e., the patient being acted upon) second. Human observers are faster in responding toward the agent than the patient information, which is called the agent advantage effect (Segalowitz, 1982). The agent advantage effect can be found in sentences, manual signs, and pictures (Cohn & Paczynski, 2013). A pilot experiment from our lab suggests that participants' slower responses to patients than agents in pictures might be caused by participants showing increased gaze toward the patient just before their response. Within the present project, we aim at studying the research question of whether it is an agent benefit or rather a patient cost that leads to the agent advantage effect in pictures. We will use an eye tracker to collect rich eye-movement data, to uncover the process of how the participants search, extract, process, and finally identify the agent (or patient), thus determining the main factors that lead to the agent advantage (or patient cost) effect when comprehending pictures.

Keywords: agent advantage effect; agent benefit; patient cost

Presentation type: No-Data Poster

Session:

Bootstrapping unconscious effects: a nonparametric approach for inferring unconscious processing

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What is the function of conscious awareness? To answer this question, the field of unconscious processing aims to delineate the limits between conscious and

unconscious processing. A rich body of empirical data suggests that information rendered invisible by psychophysical and attentional manipulations can affect cognitive and perceptual processes. Yet, these findings are commonly confronted with methodological criticisms. A prominent line of criticism was recently presented by Shanks (2017), highlighting the potential contamination of these effects by conscious processing due to regression to the mean (RttM). In this talk, we will present our solution to this problem: a Non-Parametric Bootstrapping approach (NPB) that provides a more reliable method for testing unconscious effects. We combined a controlled simulations study with a re-analysis of empirical data to explore the problem (15 studies, 43 different effects), examine our solution, and compare its performance with alternative solutions. We found that our solution has relatively high power and sensitivity, while not relying on common assumptions used in the field which are not necessarily justified. Thus, we urge the field to consider the potential effect of RttM in unconscious processing studies and suggest that our solution provides a safer means for inferring unconscious effects.

Keywords: Unconscious processing, Consciousness, Reliability, Methods, Regression to the mean

Presentation type: Oral presentation / Talk

Session: New methodological approaches to measuring unconscious mental processes

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Spatiotemporal associations between neural representational similarity and visual task performance

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Capacity limitations in visual tasks can be observed when the number of task-related objects increases. An influential idea is that such capacity limitations are determined by competition at the neural level: two objects that are encoded by shared neural populations interfere more in behavior than two objects encoded by separate neural populations. However, the neural representational similarity of objects varies across brain regions and across time, raising the question of where and when competition determines task performance. Furthermore, it is unclear whether the association between neural representational similarity and task performance is common or unique across tasks. Here, we used fMRI, MEG, and deep neural networks (DNN) to provide a detailed spatiotemporal association between neural representational similarity and performance on two tasks, both involving the same set of two-object displays. In the visual search task, participants located a pre-cued target object, while in the same/different task participants indicated whether the two objects were the same or different. Separate groups of participants viewed the individual objects in neuroimaging experiments to establish the neural representational similarity of the object set. For both tasks, the pairwise behavioral interference was correlated with neural representational

similarity throughout the visual system, from 100 ms after onset, and in all layers of a DNN. Semi-partial correlation analysis, however, revealed task-specific associations, with the same/different task uniquely associated with early/posterior neural similarity, and the visual search task uniquely associated with late/anterior neural similarity. These results provide a detailed task-specific mapping between neural similarity and behavioral interference.

Keywords: Visual search, Neural representational similarity, Visual cortex, MEG, DNN

Presentation type: Poster Presentation

Session: Visual attention

Prediction in the visual perception of moving objects: the role of attention

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Prediction plays an important role in the visual perception of moving objects. Prior studies using multivariate pattern analyses have shown that the neural representation of an object's position is updated based on predictions about its current and future positions along its motion trajectory. Thus far, this evidence for extrapolation has only been reported for explicitly tracked objects, i.e., that are the target of attention. However, it is unknown whether extrapolation also occurs for visible but unattended moving objects, i.e., not explicitly tracked. To investigate this possibility, we used a novel paradigm that could enable spatial positions of tracked and non-tracked moving objects to be independently decoded from time-resolved EEG activity. Participants simultaneously viewed two objects, distinguished by color, and were instructed to track one while ignoring the other. The objects moved in apparent motion around a circle, appearing every 100ms along unrelated trajectories. At each timepoint, there was a superposition of neural activity from both objects with information about their current and prior spatial positions and, putatively, their future, extrapolated positions. Using time-resolved position classifiers, it was possible to decode the current and prior positions of the non-tracked (and tracked) object from 2ms snapshots of neural activity. Crucially, the future position of the non-tracked object was not decodable. This was, however, not the case for the tracked object. Our findings suggest that top-down attention might be necessary for motion prediction. Accounting for how attention and prediction influence each other is an important priority for future studies of visual motion tracking.

Keywords: visual motion perception, prediction, extrapolation, MVPA, EEG, spatial positions, top-down attention

Presentation type: Oral presentation / Talk

Session: Spatial changes over time: current developments in motion perception

Grasping habits, not the end-state comfort, influence the motor imagery of manual action sequences

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It has been suggested that motor planning involves internal movement simulation or motor imagery. Previous studies indicate that predicting action consequences involves motor imagery, and motor imagery contributes heavily to movement planning. The present experiment studied the influence of grasping habits and end-state comfort on the imagery of possible and impossible manual action sequences. Thirty participants were simultaneously presented with two images. The left image depicted the start posture of a right hand when grasping a hammer, while the right image depicted the end posture in which the hammer was gripped in different grasping habits (habitual/non-habitual) and end postures (comfortable/uncomfortable). The hammer in the right image was always in a vertical orientation, while the hammer in the left image was rotated in the picture plane in steps of 45°. Moreover, the two images combined showed either a physically possible or physically impossible action sequence, and participants were asked to judge whether the two images were from the same movement or not. Results showed that participants made fewer errors and faster reactions with the habitual than the non-habitual grips in possible action sequences (all *t*s > 5.94, all *p*s < 0.001) but not in impossible sequences (all *t*s < 0.415, all n.s.). No significant difference was found between the comfortable and uncomfortable end postures in both action sequences (all *F*s < 3.48, all n.s.). These findings suggest that grasping habits seem to outweigh biomechanical constraints (i.e., end-state comfort) in motor imagery of manual action sequences.

Keywords: Mental rotation, motor imagery, action planning, grasping habit, end-state comfort

Presentation type: Poster Presentation

Session: Motor and action control

Associative memory and context reinstatement effects in younger and older adults

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Older adults often display impaired memory for associations, relative to memory for individual items. However, it is not clear to what extent this impairment stems from older adults' inability to encode associations or their inability to strategically use these associations at retrieval. Here we examined this issue by focusing on the effects of context reinstatement, where strategic use of item-to-context associations is not required. To eliminate any strategic use of context, we assessed context reinstatement not only for correct recognition of old items but also for incorrect recognition of perceptually highly similar lures. Experiment 1 demonstrated that impairing encoding of item-to-context associations in young adults eliminated both benefits and costs of context reinstatement. Experiments 2 and 3 showed that promoting encoding of item-to-context associations produced robust benefits and costs of context reinstatement in both young and older adults, even when older adults' ability to reject similar item lures remained impaired. Experiment 4 revealed that context reinstatement effects are eliminated for older adults, but not young adults, when encoding of items is promoted. This encoding orientation, however, improves older adults' ability to reject similar item lures. The results suggest that older adults are less efficient in encoding information their attention is not explicitly directed to-be it items or associations.

Keywords: context reinstatement, associative memory, cognitive aging

Presentation type: Oral presentation / Talk

Session: Memory, Speech and language processing

The nature and persistence of posthypnotic suggestions' effects on food preferences: An online study

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The persistence of food preferences is a significant obstacle to changing unhealthy eating behavior. The current study investigates whether posthypnotic suggestions (PHSs), aiming to increase the desirability of healthy food items, can enhance food-related decisions. After assessing hypnotic susceptibility in Session 1, at the beginning of Session 2, PHS was delivered. After the termination of hypnosis, a set of two tasks was administrated twice, once when PHS was activated and once deactivated in counterbalanced order. The task set consisted of rating 170 pictures of food items, followed by an online supermarket where participants were instructed to select enough food for a fictitious week of quarantine. After one week, Session 3 mimicked Session 2 without renewed hypnosis induction to assess the persistence of the effects. The Bayesian hierarchical modeling indicates that PHS increased preferences and choices

of healthy food items without altering the influence of preferences in choices. In contrast, for unhealthy food items, not only both preferences and choices were decreased due to PHS, but also their relationship was modified. Although choices became negatively biased against unhealthy items, preferences played a more dominant role in unhealthy choices when PHS was activated. Notably, all effects persisted over one week, qualitatively and quantitatively. Our results indicate that although PHS affected healthy choices through resolve, i.e., preferred more and chosen more, unhealthy items were probably chosen less impulsively through effortful suppression. Together, our results suggest PHSs as a promising tool for counteracting the overweight and obesity epidemic in modern societies.

Keywords: eating behavior, food choice, food preferences, hypnosis, online supermarket, posthypnotic suggestions (PHS)

Presentation type: Oral presentation / Talk

Session: Attitude formation and decision making

Confidence in the face of external cues

Katarzyna Zawadzka [1], Paulina Pietrak [2], Maciej Hanczakowski [1]

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When providing answers in a memory task, people are often influenced by information from coming from other sources than their own memory. In old/new recognition tests people incorporate information regarding the likelihood that a given probe is old or new into their own responses. At the same time, these external prompts affect confidence in old and new responses differently: they have little effect when a participants thinks the probe is old, but for probes thought to be new they increase confidence when the prompt and the response are in agreement, compared to when one points in the opposite direction to the other. Across four experiments, we investigated boundary conditions for these prompt validity-dependent confidence-accuracy dissociations. Our results demonstrate that this empirical pattern is not due to question framing, and is not specific to simple recognition tests and confidence ratings, but it disappears when “new” test responses are recollection based. Thus, our findings show that confidence in one's recognition decisions is affected by external cues when there is no strong memory evidence to support those decisions, but is resistant to external influence when this evidence is available.

Keywords: recognition, metamemory, confidence, external cuing

Presentation type: Oral presentation / Talk

Session: Attitude formation and decision making

The effect of false performance-related social comparison feedback on affect, cognitive orientation and behavior

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The general comparative-processing model of self-perception (Morina, 2021) proposes that the outcome of a comparison between a target and standard is evaluated against its motivational meaning and may engender different emotional, cognitive and behavioral responses. Specifically, it predicts that a comparison outcome evaluated as threatening will lead to pessimistic coping, which entails elevated negative affect and cognitive responses such as distraction, rededication (i.e., deeming the task outcome as unimportant) or reconstrual (i.e., attributing the task outcome to external factors), which may lead to avoidance. In contrast, a comparison outcome evaluated as rather challenging should lead to optimistic coping, excitement and commitment to improve behavior and behavior maintenance. To test this experimentally, participants performed a 2-back task, which was introduced as a predictor of academic performance. Participants were randomly assigned to either a high (n = 77) or low (n = 74) threat condition, in which they received false performance-related social comparison feedback. The main outcome variables were affect and cognitive orientation (i.e., questionnaires) as well as behavior (i.e., option to repeat the task). As predicted, the high threat group showed a larger increase in negative affect and a larger decrease in positive affect than the low threat group after the task. Concerning cognitive orientation, the high threat group showed more rededication and less commitment than the low threat group. However, this latter finding did not transfer to behavior as no between-group differences in repeating the task were observed. Possible reasons for this and future directions will be discussed.

Keywords: social comparison, false feedback, affect, cognitive orientation, 2-back task

Presentation type: Oral presentation / Talk

Session: The relative self: Social comparison and its implications for cognition, well-being and self-construal

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Is the description-experience gap a gap in attention?

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Preferences in risky choice often differ systematically depending on whether people learn about the options based on abstract descriptions of outcomes and probabilities (decisions from description), or by repeatedly sampling the options' payoff distributions (decisions from experience). This description-experience gap is often formalized in

terms of differences in the weighting of probabilistic events between description and experience. However, it is not clear how such differences might come about. Here we test a mechanistic, attentional account of differences choice behavior and probability weighting between description and experience. We demonstrate that people attend systematically more to risky options (vs. safe options) in experience compared to description. Attending more to the safe option was linked to a higher tendency to choose this option in both paradigms. Moreover, attention allocation was linked to the elevation and curvature of probability weighting functions in experience and in description. Therefore, differences in attention allocation between description and experience mediated differences in choice behavior and probability weighting between the paradigms. These analyses offer a novel process-based understanding of how the ways in which people learn about risky prospects may shape attention allocation, and thereby give rise to differences in preferences and probability weighting patterns indicative of a description-experience gap.

Keywords: attention, risky choice, description-experience gap, Cumulative Prospect Theory, probability weighting, cognitive modeling, computational modeling

Presentation type: Oral presentation / Talk

Session: Computational Approaches to Modeling Cognition

Overriding exogenous spatial cueing by predictive cue information with emotional content does not affect early stages of stimulus processing – an ERP study

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Studies of spatial cueing have demonstrated facilitated processing of targets presented at likely compared to unlikely locations and to targets occurring at the location of an (unpredictive) advance cue compared to an uncued location. These effects—referred to as endogenous and exogenous spatial cueing, respectively—are associated with enhanced sensory potentials (i.e., posterior P1) evoked by the target stimulus in EEG recordings. Processing is also affected by emotional cue content, suggesting dwelling of attention at locations of fear-related stimuli and diverting of attention from locations of disgust-related stimuli. To investigate the interplay of these factors we presented, in different groups of participants, the target stimulus at the (lateral) location of the cue vs. at the opposite location with likelihood ratios of 75%/25% and 25%/75%, respectively, and added emotional content to the cue. Responses were overall faster when the target occurred at the likely location. In line with opposing attentional tendencies evoked by fear-related and disgust-related content, this was modulated by emotional cue content. Regarding ERPs, trials with unlikely target locations featured a positive deflection in the P3 range, which occurred earlier when the likely target location equaled the cued

location, presumably reflecting adjustment to an unexpected stimulus event. By contrast, the posterior P1 was larger in trials in which the target occurred at the cued location (even with a SOA of 800 ms), irrespective of target location likelihood and of emotional cue content. Overriding exogenous cueing by using predictive information thus occurs despite an opposing bias during early stimulus processing.

Keywords: spatial attention, emotion, likelihood ratio, ERP, P1-component

Presentation type: Oral presentation / Talk

Session: Basic attention

Global context guides early attentional selection independent of item identity in visual search: evidence from lateralized event-related potentials.

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Stable spatial arrangement of items can efficiently guide attentional selection and facilitate visual search over time, a phenomenon known as contextual cuing. On the other hand, updating of already formed long-term context memories in the relocation is rigid. In the current work, we explored whether global context regularities can guide and mis-guide early attentional selection in the absence of individual item identities. We used lateralized event-related electroencephalogram potentials and presented a group of participants (N = 16) with repeated and non-repeated displays that were preceded by a spatial mask for 500 ms. The mask contained placeholders of search items that didn't reveal the identity of the search items. We found a reliable contextual cuing during the initial learning phase, which was associated with an early N1pc ERP component: negativity that peaks ~150 ms after stimulus onset. Contextual cuing was effectively abolished in the relocation phase, and the N1pc was reversed in polarity, which is indicative of persistent misguidance of attention to the original target location. Repeated layouts proactively interfere with contextual relearning after target relocation, even in the absence of stimulus identities.

Keywords: N1pc, N2pc, CDA, context-guided attention, contextual cueing, automaticity

Presentation type: Oral presentation / Talk

Session: Basic attention

Are threatening stimuli special? – A comparison of the ability to ignore stimuli with different emotional valences

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It has previously been shown that emotional pictures catch and hold attention more so than neutral ones. Previous studies have suggested, however, that not all emotional dimensions are equally prioritized. Threatening stimuli may have a greater prominence than other emotional categories. Therefore, here we tested the effects that stimuli which elicit varying emotions (threatening, positive, negative nonthreatening) would have on orienting and executive attentional processes. We presented emotionally charged and neutral pictures as task-irrelevant distractors while participants performed a visual search task (finding numbers in ascending order). Participants' eye movements were also monitored. Our results showed that the initiation of the task was slower when a threatening image was presented compared to other emotional and neutral stimuli; however, overall task performance was faster in the presence of threatening and positive distractors (compared to negative or neutral ones). Eye movement data showed that threatening (compared to nonthreatening distractors) were fixated upon earlier and were observed longer throughout the task. Our conclusion is that the effects of emotionally charged stimuli on attention depend on the nature of the emotions they evoke. Both threatening and positive stimuli can facilitate visual performance, but possibly through different background mechanisms.

Keywords: visual search; emotion; task load; number matrix; visual working memory

Presentation type: Poster Presentation

Session: Emotion cognition

Workshops

Research Data Management in Psychology

Katarina Blask

Leibniz Institute for Psychology (ZPID)

This workshop aims to 1) introduce the diverse tasks of research data management (RDM) along the research process, 2) demonstrate their benefits and 3) provide a blueprint for integrating these tasks into one's own daily research routine. Besides a general introduction to RDM and Open Science, all relevant aspects for the creation of a data management plan or similar documents, an introduction to best practices of data documentation as well as available archiving infrastructures will be covered. The overall aim is to share best practices for quality-assured RDM in psychology.

Glia: Building experiments in R

Felix Henninger

Ludwig Maximilian University of Munich

Over the past decade, the R environment for statistical computing has firmly established itself as the standard for data processing in psychology and many social sciences. It provides a multitude of data handling and analysis capabilities, and is now routinely taught to students early on. Despite the widespread familiarity of researchers with R, building experiments has heretofore often required picking up an entirely new programming language and skillset. We present a versatile, high-performance package for constructing and running experiments in R, and demonstrate its timing capabilities. The package builds upon the powerful functionality present in the R ecosystem, allowing for direct integration of data collection and processing, and more advanced designs such as adaptive experiments. With it, researchers at every career stage can now apply their knowledge of R to the construction of experiments.

Ask a PhD / PostDoc Workshop

Silvia Selimi, Philip Schmalbrock

University of Trier

This workshop is aimed at all undergraduate students (B.Sc./M.Sc.) participating in this year's TeaP who are interested in science and considering pursuing a doctorate. Topics of this workshop include an introduction to the daily work and working conditions in science, as well as insights regarding the scope of a doctorate and typical tasks. The workshop will provide an overview of the different types of PhD positions, the advantages and disadvantages of each, and resources on how to find a PhD position. Most importantly, the workshop will provide an opportunity for students to discuss questions with early career researchers.

Preregistration in Psychology - A Hands-On Workshop

Lisa Spitzer

Leibniz Institute for Psychology (ZPID)

This workshop is aimed at researchers who are relatively new to preregistration or who have unanswered questions during preregistering their studies and would like to clarify these uncertainties. The workshop will be divided into two parts: The first part will give a general introduction to preregistration and will illustrate why it is important that researchers preregister their studies, which will be supported by the latest findings from our own research. In the second part, participants will be guided through the preregistration process and will create their own preregistrations using the PRP-QUANT template (https://doi.org/10.23668/psycharchives.4584). For this purpose, the template will first be presented in more detail. Participants will then have time to work on their own preregistrations. Afterward, participants will work in teams of two to receive peer feedback on their preregistrations. The workshop will conclude with a demonstration of the ZPID's preregistration platform PreReg (https://prereg-psych.org/) where preregistrations can be published to complete the preregistration process. Lastly, we will discuss all further questions and open issues so that at the end of the workshop, participants will be empowered to complete their preregistrations on their own based on the input of the workshop and their peer's feedback.

Theory and practice of Bayesian inference using JASP

Johnny van Doorn

University of Amsterdam

This workshop will provide attendees with a friendly, gentle introduction to Bayesian statistics, as well as demonstrate how to perform various Bayesian analyses (e.g., t-test, ANOVA, regression) using JASP statistical software. Workshop attendees will

come away understanding the "why" and "how" of Bayesian estimation and hypothesis testing. This workshop is relevant to any student or researcher who wishes to draw conclusions from empirical data. No background in Bayesian statistics is required.

Demonstrations

DataWiz: Research Data Documentation in Psychology Made Easy

Katarina Blask

Leibniz Institute for Psychology (ZPID)

In recent years, it became obvious that Open Science practices, like sharing research data in a (re)usable way means additional effort. In particular, the quality-assured and sustainable provision of research data requires at least a minimum of data documentation. For optimal (re)use, typically three levels of data documentation or metadata are needed: (1) The basic resource description for collection management and resource discovery (Dublin Core); (2) the study-level documentation for research context and methods; and (3) the data-level documentation (codebooks or data dictionaries). In order to facilitate the laborious task of data documentation in psychology, a web-based tool - named DataWiz - was developed. The primary goal of the development project funded by the German Research Foundation was to lower the hurdle to do data documentation and to make it an integral part of common research practices in psychology. This demo aims to introduce the documentation module of DataWiz, which allows researchers to create a research data object containing the data and metadata in a non-proprietary format that can be uploaded to research data repositories.

PsychNotebook: Create, share, and export your code projects / teach coding

Lars Braun

Leibniz Institute for Psychology (ZPID)

PsychNotebook is a platform that offers statistical software such as RStudio and JupyterLab in an online environment. It is a tool to promote open science, in particular transparent and reproducible analyses, with a focus on teaching and collaboration. PsychNotebook supports teaching (and learning) code-based analyses by removing the hassle of installing or setting up software. In PsychNotebook you can create projects that contain scripts, data, instructions and more. You can share your projects with your students (copy access) or your collaborators (edit access) so that recipients work with exactly the same files in exactly the same software environment. Problems caused by working on different versions or in different directories are thus eliminated. Likewise

projects can be easily archived and then imported again, resulting in the same scripts running in the same software environment as before. In this demonstration, I will introduce the features of PsychNotebook described above.

PsychArchives: The disciplinary Repository for Psychological Science

Yi-Hsiu Chen, Lea Gerhards

Leibniz Institute for Psychology (ZPID)

This demo will introduce PsychArchives, the disciplinary repository for psychological science. Recent years have seen the gradual but sustained growth in practices collectively known as 'Open Science'. Part of this ongoing cultural change, which is well underway in Psychology, has been a growing advocacy for transparency and access to research output from across the entire research cycle. PsychArchives, which is maintained by the Leibniz Institute for Psychology (ZPID), provides the necessary sustainable infrastructure to achieve these goals. In PsychArchives, a variety of digital research objects, including articles, preprints, research data, code, supplements, preregistrations and tests, are safely stored and made accessible for the long term.

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emoTouch Web: A Web-Based System for Continuous Response Studies and Audience Feedback in Live-, Lab- and Online Settings

Christoph Louven, Carolin Scholle, Fabian Gehrs

Osnabrück University

emoTouch Web is a new web-based system for designing, conducting, and evaluating continuous response real-time studies. It is based on web and network technologies and turns any modern smartphone, tablet, laptop and desktop computer into a flexible and reliable research and audience feedback tool in laboratory, online, and live settings. The interface of emoTouch studies is completely configurable and may contain an unlimited number of interface elements like one-dimensional sliders, 2D rating areas, category scales, checkboxes, buttons, images and text elements. Any audio or video files can also be integrated and will play from the participant's devices. The interface will dynamically adapt to the various screen sizes and ratios. Once a study is designed and started, it can be accessed just by scanning the study's QR Code. Subjects can even participate with the smartphones they carry in their pockets anyway ('Bring-Your-Own-Device', BYOD). This easily enables e.g. audience studies and feedback situations with hundreds of participants at the same time. For the evaluation of the collected real-time data, emoTouch also contains coordinated tools for the graphical and numerical

display and analysis of the data in longitudinal and cross-section. emoTouch Web can be useful in all disciplines that deal with time-bound phenomena, such as music, theatre, dance, film, commercials, lectures, speeches or sport events. The system was developed at the musicology department of Osnabrück University (Germany) and is available free of charge for scientific purposes at https://www.emotouch.de. The demonstration shows the possibilities of the system as well as the flow of a typical research process with emoTouch Web.

PreReg: Preregistration in Psychology

Lisa Spitzer

Leibniz Institute for Psychology (ZPID)

Preregistering studies is an effective open science technique because it documents which (analytical) decisions were made prior to knowing the data. However, preregistration involves additional effort. ZPID, the Leibniz Institute for Psychology, fosters open science practices in psychology and related disciplines by providing researchers with tools and services at each stage of the scientific process. The Pre-Registration in Psychology platform (https://prereg-psych.org) provides information on preregistration, templates for creating your own preregistration, and the possibility to easily submit and publish to a repository. The platform is introduced in this demonstration.

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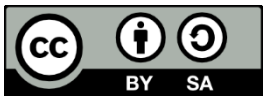

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