

# Book of



Goethe  
University  
Frankfurt  
March 9<sup>th</sup>–12<sup>th</sup> 2025



of the **67<sup>th</sup> Conference of Experimental Psychologists**  
— 67. Tagung experimentell arbeitender Psycholog\*innen

# Abstracts

Edited by  
Melissa Lê-Hoa Võ, Christian Fiebach, Yee Lee  
Shing, Daniela Sammler, Sabine Windmann,  
Jochen Kaiser

## IMPRINT

Bibliographic information from the German Library

The Deutsche Bibliothek lists this publication in the Deutsche Nationalbibliografie; detailed bibliographic data can be accessed on the Internet at <http://dnb.ddb.de>

Protected product names (trademarks) are not specifically identified. It cannot be concluded from the absence of such a reference that it is a free product name.

The work including all its parts is protected by copyright.

Any use outside the narrow limits of copyright law without the consent of the publisher is inadmissible and punishable.

This applies in particular to duplications, translations, microfilming and storage and processing in electronic systems

© 2025 Pabst Science Publishers · D-49525 Lengerich/Westfalen

[www.pabst-publishers.com](http://www.pabst-publishers.com)

[pabst@pabst-publishers.com](mailto:pabst@pabst-publishers.com)

ebook: ISBN 978-3-95853-975-4

TeaP 2025 Frankfurt am Main

Frankfurt am Main, Germany, April 2025

Responsible for the content: TeaP 2025 Organizing Committee

Typesetting by Antonia Ceric, Daniela Sammler.

## TABLE OF CONTENTS

|                                |     |
|--------------------------------|-----|
| IMPRINT .....                  | 2   |
| THE TEAP 2025 TEAM .....       | 4   |
| SPONSORS .....                 | 5   |
| KEYNOTE LECTURES .....         | 7   |
| PRE-CONFERENCE WORKSHOPS ..... | 9   |
| SYMPOSIA .....                 | 13  |
| ORIGINAL RESEARCH TALKS .....  | 43  |
| POSTER PRESENTATIONS .....     | 354 |
| PRE-DATA POSTER .....          | 562 |
| AUTHOR INDEX .....             | 589 |

## THE TEAP 2025 TEAM

### ORGANIZING COMMITTEE

|                   |                   |
|-------------------|-------------------|
| Melissa Lê-Hoa Võ | Christian Fiebach |
| Yee Lee Shing     | Daniela Sammler   |
| Sabine Windmann   | Jochen Kaiser     |

Institute of Psychology, Goethe University Frankfurt

Institute of Medical Psychology

Max Planck Institute for Empirical Aesthetics

### TEAM

TeaP2025 banner and logo: Ronja Schnellen

Conference badges: Lorna Bittner, Felix Bernouilly

Conference bag creation: Lea Alexandra Müller Karoza, Maral Dadvar

Talk session and poster arrangement: Seung-Goo Kim

Website, program book: Antonia Ceric, Ronja Schnellen, Saskia Bernshausen, Henri Kracke

Abstract reviewers: Seung-Cheol Baek, Christoph Bledowski, Philipp Deutsch, Christian Fiebach, Dingrong Guo, Cosimo Iaia, Jochen Kaiser, Aylin Kallmayer, Seung-Goo Kim, Yibiao Liang, Yuri Markov, Lea Alexandra Müller Karoza, Victoria Nicholls, Daniela Sammler, Iryna Schommartz, Yee Lee Shing, Alessandro Tavano, Jack E. Taylor, Dilara Deniz Türk, Melissa Võ, Sandro Wiesmann, Sabine Windmann, Anna Leah Zier

Coordination of student assistants: Sandro Wiesmann

Student assistants: Saskia Bernshausen, Antonia Beyer, Esther Blagooee, Ashley Bollmann, Zoe Bolz, Carolin Boschner, Antonia Ceric, Elena Erbar, Nele Haag, Karla Hartleb, Theresa Henke, Maya Höfler, Greta Humm, Henriette Köpke, Xenia Langer, Jade Leuschner, Niklas Lewalter, Henri Luley, Jonathan Mader, Annika Platz, Jona Sacher, Lorenz Scherpenbach, Valentina Schirra, Sebastian Schmidt, Ronja Schnellen, Marie Sophie Sieben, Rasmus Sinn, Rebecca Svoboda, Anton Tautz, Jacqueline Tran, Muriel Valentin, Valeriia Wasserman

Administration: Bettina Schultz, Bianca Seibert, Sabine Tuchtfield



## SPONSORS

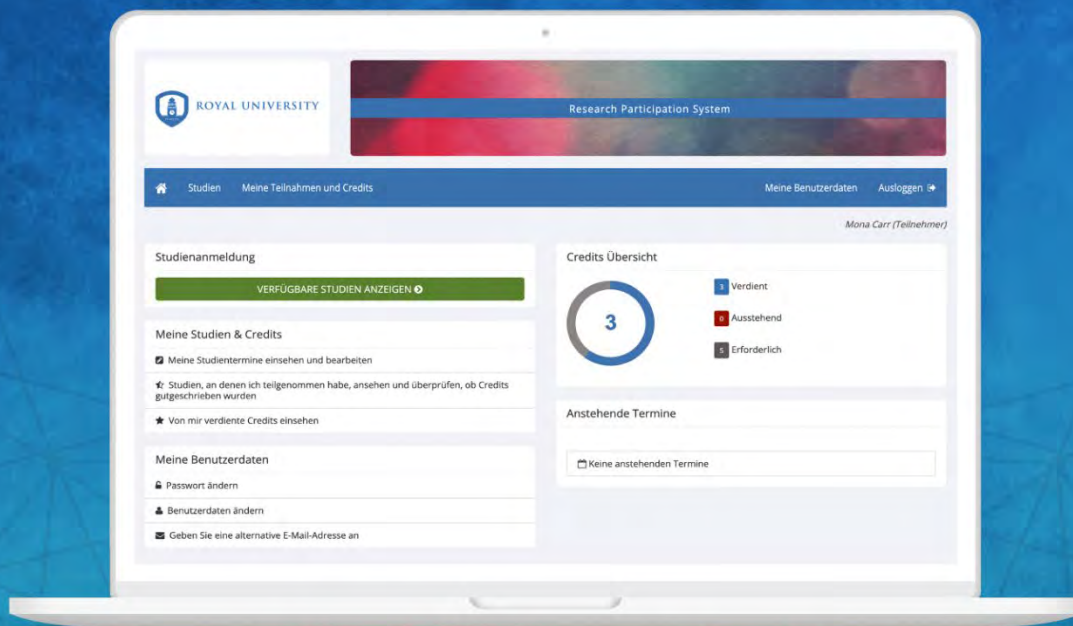
TeaP 2025 is kindly supported by



Thank you for working with us!

## PARTICIPANT POOL & STUDY MANAGEMENT SOFTWARE

Sona Systems allows you to build and manage your own participant pool and manage your department's lab and online studies in one place, as well as track participation for course credit and paid studies.



**Increase your  
participation rates  
up to 25-50%**



**Reduce participant  
no-show rates to  
below 5%**



**Eliminate the need  
for paper-based  
sign-ups**



### Used by More Than 40 Universities in Germany

Sona Systems is used by all of the top 50 universities in the US and the majority of all universities in the UK, Canada, and Australia.



**Try a Free 30 Day Demo Today**

[sales@sona-systems.com](mailto:sales@sona-systems.com)

[sona-systems.com](http://sona-systems.com)



## KEYNOTE LECTURES

---

### **How did I miss that? How we ‘look but fail to see’ in the lab, the clinic, and the world**

Jeremy Wolfe

*Department of Ophthalmology, Harvard Medical School, Boston, USA*

Why don't we see everything that we want to see or that we think we should see? From typos to tumors to gorillas in Introductory Psychology demos, humans manage to routinely miss targets that are "right in front of our eyes". In the psychologically most interesting cases, these are instances where observers fail to respond to stimuli that are clearly visible. The observers may even directly fixate on those stimuli. Some of these "Looked But Failed to See" (LBFTS) errors are life-threatening (e.g. missing that tumor or a weapon in carry-on baggage). Nevertheless, such errors are common enough that we can describe them as "normal blindness". If you are a radiologist in the US, these errors can lead to malpractice legal cases. When should an LBFTS error be considered to be legal negligence. I will give a four-part account of LBFTS errors: Human visual attention is 1) limited, 2) misguided, 3) incomplete, and 4) misunderstood. I will place this in the context of the Guided Search 6.0 model and I will illustrate with some demonstrations and with an emphasis on examples from radiology. If all goes well, you will look, you will fail to see, and you will gain insight into why that happens.

---

### **From dyadic exchange to intergroup cooperation. How (in)direct reciprocity can help us understand when and why people help each other**

Jörg Gross

*Department of Psychology, University of Zurich, Switzerland*

Challenges like climate change require large-scale cooperation. To effectively address such global issues, it is essential to understand the factors that facilitate and constrain human cooperation.

From the outset, cooperation poses a fundamental puzzle, as it always carries the risk of exploitation. If others are cooperating, why not simply reap the benefits without bearing the costs? And if others are not cooperating, why should you? From this logic, it would seem that cooperation should be difficult to sustain or even non-existent. Yet, the extent of cooperation we witness appears to contradict this logical dilemma. From social insects to human societies, cooperation seems to be the rule rather than the exception. In this talk, I will present both theoretical and empirical findings that shed some light on the conditions under which cooperation can be sustained, as well as those that lead to its breakdown. I will specifically focus on the principles of reciprocity and interdependence. These foundational principles, I will argue, not only explain why cooperation persists, but also help us predict its scope—whether it occurs among friends, tightly-knit groups, or even across broader intergroup structures. These insights, resulting also from the interdisciplinary cooperation across the social sciences, may help us understand the types of institutions needed to transcend localized cooperation and promote large-scale, intergroup cooperation.

---

## **Coordinating with others in time and through touch**

Merle Fairhurst

*Center for the Tactile Internet, TU Dresden, Germany*

In this talk, I will present some of my recent studies investigating how we coordinate our movements in time with groups of others as well as my projects on virtual touch. I will propose that as a fundamentally social species, we are able to fulfill our need to feel connected to others by either inferring colocation in space or some form of joint action. Principally, my work investigates how we do this by using our senses to dynamically exchange social information with others. The work presented will highlight how these topics allow me to combine novel technologies. In the first half of the talk, I will show examples by presenting preliminary data from two group coordination studies, one using virtual reality and the other employing a Zoom-based version of the improvisational theatre Mirror Game combined with Motion Energy Analysis. I will then move onto discussing our recent and ongoing experiments that make use of both virtual reality and our mobile application "HandsOn" to probe individual touch behaviours and preferences.



## PRE-CONFERENCE WORKSHOPS

---

### **Workshop 1 — Deep learning in psychology: Theory and praxis**

Martin Hebart & Giacomo Aldegheri

*University Gießen*

Recent years have seen strong progress in artificial intelligence, with deep neural networks playing a central role in many of these developments. These developments have also entered the cognitive sciences, both as new tools to support experiments and as computational models, with an impressive performance at accounting for a range of diverse behaviors. Still, their ability to explain phenomena rather than merely predict behavior has not been undisputed. In this workshop, we would like participants to learn about recent developments in using deep neural networks to address questions relevant to psychologists, both from a theoretical perspective and with hands-on experience. The workshop will be centered around work on visual cognition, semantic knowledge, and language. In the morning, there will be talks covering basics about commonly used model families and introducing different approaches of how these models can be used in scientific practice. In the afternoon, participants will learn to extract neural network activations, relate them to diverse behaviors, and depending on the background knowledge understand how to finetune or train neural networks. Together, this workshop should offer an entry point for psychologists interested in using and applying recent advances in deep learning.

---

### **Workshop 2 — Embodied social fNIRS: Systemic physiology augmented functional near-infrared spectroscopy (SPA-fNIRS) and hyperscanning hands-on**

Adam Takacs & Dalila Burin

*NIRx*

This workshop starts from the basics of Functional Near-Infrared Spectroscopy (fNIRS) with physiological measures and culminates with a hands-on practice on hyperscanning. In the first part, participants will receive a comprehensive introduction to fNIRS, gaining a solid understanding of its principles and benefits, including a focus on NIRx's solutions. Then, physiological measurement

techniques will be covered, exploring their fundamentals and common applications, including novel hardware solutions. In the second part, participants will join the hands-on experience: smaller groups will practice the setup of the fNIRS and physiology tools. Finally, during the hyperscanning practice, members of the teams will interact with each other while systemic physiological and cortical activities will be recorded in a synchronized fashion. This workshop offers a concise yet impactful learning experience for both beginners and experienced researchers aiming to enhance their skills in fNIRS and physiological measurements using NIRx solutions.

---

### **Workshop 3 — Modern Bayesian statistics**

Timo von Oertzen & Hannes Diemerling

*Thomas Bayes Institute, Berlin*

Null hypotheses testing is no longer state of the art. Nevertheless, many empirical researchers still default to it, even using significance testing, as the switch to modern methods seems a difficult step to do. In this workshop, we will discuss why Bayesian methods are in fact easier than null hypotheses testing (and way more fun, although sadly not so well suited to show off as you might think). We will play hands-on with theoretical concepts to get to know them better, and work practically on how to do Bayesian analyses efficiently. We will discuss possible choices for priors and how to reach these decisions. Finally, and importantly, we work on what strategies can be employed to switch a project team, a lab, or a whole department to modern Bayesian methods without breaking the flow of things.

---

### **Workshop 4 — Mixed models made easy: An introduction to Jamovi**

Liza Mekschrath & Jochen Hardt

*Mainz University*

The workshop presents an overview to mixed models and their advantages over ANOVA and regression in repeated measurement designs. Based on a sample dataset, handling with Jamovi will be demonstrated and exercised by the participants themselves. We recommend to install Jamovi already onto your computer (download at [jamovi.org](http://jamovi.org)). Alternatively, Jamovi can be used via internet. Jamovi is free of costs and to our best knowledge free of viruses and advertisements.

## **Workshop 5 — Integrating EEG and eye tracking: Bridging neuroscience and behaviorial insights**

Laura Leuchs & Edyta Charyasz

*MES*

The combined use of electroencephalography (EEG) and eye tracking offers opportunities to investigate the interplay between brain activity and visual behavior. This workshop aims to provide participants with a fundamental understanding of these complementary methodologies and equip them with the practical skills necessary for their integration in research. The session will begin with an accessible introduction to the theoretical principles of EEG and eye tracking, including their respective strengths, limitations, and the scientific questions they can address when used together. Participants will gain insight into the technical aspects of signal acquisition, data synchronization, and preprocessing. Real-world examples of combined EEG and eye tracking applications will illustrate the potential of this approach. The workshop will emphasize hands-on learning, with ample time dedicated to practical demonstrations and interactive activities. Attendees will explore equipment setup, data collection, and basic analysis workflows using synchronized EEG and eye-tracking datasets. This workshop is designed for researchers, students, and practitioners from diverse fields, including neuroscience, psychology and human-computer interaction. No prior experience is required, but familiarity with basic research concepts will be helpful. By the end of the workshop, participants will have new ideas about incorporating EEG and eye-tracking into their own research and will leave with resources to deepen their expertise.

---

## **Workshop 6 — From Open Science to FAIR science**

Zefan Zheng, Camila Bruder, Alexandre Lepauvre, Seung-Goo Kim

*Max Planck Institute for Empirical Aesthetics, Frankfurt/M.*

This workshop brings together researchers and practitioners to tackle key challenges in open science, focusing on reproducibility, transparency, and collaboration, with a particular emphasis on cognitive neuroscience. The first talk introduces a FAIR (Findable, Accessible, Interoperable, Reusable) workflow to improve the reproducibility of scientific knowledge, enhance data discoverability, and recognize diverse contributions in open science. Through a domain-specific

metadata template and a novel dashboard for visualizing research outputs, this session presents actionable solutions to promote fairness for science, data, and scientists. The second talk highlights the transformative potential of registered reports in advancing transparency and replicability. Drawing on the speaker's experiences with the Peer Community In Registered Reports (PCI-RR) platform, participants will gain practical insights into the benefits and challenges of this format, including its application in both individual research and large-scale collaborations. The third talk focuses on ensuring experimental integrity, addressing a critical gap in reproducibility efforts. This hands-on session equips participants with skills to rigorously test and report experimental setups using tools like PsychoPy and Psychtoolbox, fostering robust and reproducible research. Finally, the fourth talk opens a dialogue on the economic, ethical, and technical dimensions of open-source computing. Exploring sustainability, transparency, and optimal computing languages, it invites attendees to share their experiences and contribute to shaping the future of open science computing. Together, these talks offer practical tools, insights, and discussions to advance open, transparent, and impactful science across disciplines.

---

## **Workshop 7 — Cognitive behavioral therapy with VR exposure: Innovative approaches for practice and at home**

Carola Eppe<sup>1</sup>& Patrik Scholler<sup>2</sup>

<sup>1</sup>LabE GmbH, <sup>2</sup>Life Sciences Consulting

This workshop explores the integration of Virtual Reality Exposure Therapy (VRET) into Cognitive Behavioral Therapy (CBT), examining its current applications, innovative practices, and potential future developments. The session begins with an overview by Carola Eppe, highlighting the historical evolution of VRET, its efficacy compared to traditional exposure techniques, and its practical implementation in therapy, alongside existing limitations. Dr. Patrik Scholler introduces advanced approaches that enhance patient autonomy, optimize therapeutic outcomes, and address economic considerations, including the potential for at-home therapy solutions. Looking ahead, Carola Eppe discusses emerging trends such as interactive intensity adjustments, telemedical support to reduce in-person sessions, and the role of VRET in the broader landscape of digital health. A panel discussion concludes the session, addressing the opportunities and challenges of integrating VRET into clinical practice and everyday life. This presentation offers valuable insights for mental health professionals, researchers, and digital health practitioners seeking to harness the potential of VRET in enhancing CBT. The workshop has a duration of 90 minutes and is offered 4 times in a row (each with max. 20 participants).

## SYMPOSIA

---

### **From Berries to Brains: Insights into Search Behavior from Visual Foraging – Part I: Spatial and Feature-based Attention**

Jan Tünnermann<sup>1</sup>, Árni Kristjánsson<sup>2</sup>, Iris Wiegand<sup>3</sup>

<sup>1</sup> *University of Marburg*, <sup>2</sup> *University of Iceland*, <sup>3</sup> *Radboud University Nijmegen*

In visual foraging, individuals look for multiple instances of different target types among distractors, much like picking berries within a field of many bushes. The efficiency of berry picking depends on various factors, among them the features and spatial distribution of the berries. In Part I of this symposium, we focus on spatial and feature-based attentional processes that underlie item selections in visual foraging. Clarke presents a generative model that predicts item selection based on spatial factors and explains spatial biases in selections. Tünnermann et al. demonstrate how participants adapt their foraging behaviour according to subtle structures of the environment - even when this structure is not necessary for finding targets - highlighting the influence of environmental regularities. Thornton employs a variant of visual foraging that can be used to examine temporal effects over multiple target selections, such as inhibitory tagging. Sauter demonstrates how eye-tracking allows us to understand the relationship between visual attention and manual actions during foraging. Finally, Tagu et al. demonstrate interactive effects of the targets' emotional valence and participants' trait anxiety on selections during visual foraging, highlighting the role of individual differences, in particular when using ecologically relevant stimuli. In Part II, we will turn to the decision processes and strategies involved in visual foraging, which contribute to search efficiency in addition to attentional processes.

---

### **Negation in language and beyond**

Carolin Dudschig<sup>1</sup> & Yvonne Portele<sup>2,3</sup>

<sup>1</sup> *University of Tübingen*, <sup>2</sup> *Goethe University Frankfurt*, <sup>3</sup> *Free University Berlin*

Negation is a linguistic universal, present in every known language. Negation in its narrow sense is often viewed as a grammatical construction used to indicate that something is not true or to deny a statement. It usually involves lexical items such as “not,” “no,” or negative verb forms. However,

negation can also be expressed non-verbally and has sparked interest in general cognition for several reasons. On the one side, negation in its most advanced form is often viewed to be a complex mental process, as our brain first has to understand the positive idea (what is) before rejecting or modifying it (what is not). Thus, negation likely engages different mental processes, such as memory, inhibition, and reasoning and helps us to handle abstract concepts, contradictions, and hypothetical scenarios. On the other side, negation is one of the earliest communicated information by children - which results in an interesting contrast with the complexity often attributed to negated compared to affirmative statements. This symposium will bring together researchers examining the phenomenon of negation from multiple perspectives and disciplines, aiming to uncover its complexities and deepen our understanding of key aspects and mechanisms of negation relevant for cognition. Talks present investigations of negation in different modalities (production and comprehension) and employing different paradigms (e.g., eye tracking, cloze task). They encompass different linguistic levels (semantics, pragmatics) as well as psychological angles (e.g., memory, reasoning) and moreover broaden the scope by including non-verbal negation.

---

## **Understanding the power of voice: Insights from emotion, neural mechanisms and interindividual differences**

Silke Paulmann<sup>1</sup> & Maren Schmidt-Kassow<sup>2</sup>

<sup>1</sup> *University of Essex*, <sup>2</sup> *Goethe University Frankfurt*

This symposium brings together diverse perspectives on the profound influence of vocal communication, exploring how voices impact listeners' emotions, behaviours, and physiological responses in both every day and clinical contexts. We will present the multifaceted impact of voice—from understanding how listeners rapidly form first impressions of voices and process characteristics such as age, gender, and trustworthiness within milliseconds, to offering insights into how predictive processes in voice perception may explain auditory verbal hallucinations. We will highlight the effects of acute and prolonged stress on emotional voice perception and explore the role of social support in this process. The symposium will also help understand how speakers from tonal and non-tonal languages differ in decoding communicative intentions. Throughout the symposium, we will consider how individual differences, such as gender, musical training, stress, or empathy levels, affect auditory sensitivity to vocal cues. By integrating insights from neurocognitive, behavioural, and emotional perspectives, the symposium will offer a comprehensive understanding of how voices shape human interaction and perception, with valuable implications for clinical, educational, and social settings.



## **Cognitive processes in decisions from experience**

Thorsten Pachur<sup>1</sup>

<sup>1</sup> *Technical University of Munich*

When people make decisions between options whose properties they have learned from experiential sampling, their preferences differ compared to situations where information about the options' properties are provided as summary descriptions. For a long time, research on this description-experience gap has focused on understanding the reasons for this gap. Only recently have researchers started to investigate in detail the cognitive processes in decisions from experience. The goal of this symposium is to feature recent insights into the cognitive foundations of decisions from experience, highlighting how they tap into a wide range of psychological functions such as learning, cognitive representation, memory retrieval, attention, and cognitive control. The contribution by Olschewski et al. shows that due to the cognitive requirements to store and update information for either one option (in a valuation task) or two options (in a choice task) in decisions from experience, people's apparent preferences can reverse between tasks. Busch and Pachur demonstrate that loss aversion—the notion that the cognitive representation of losses carries larger weight than that of gains of the same magnitude—is more pronounced in experience- than in description-based choice. Nasioulas et al. reveal how the feedback that people obtain in decisions from experience not only shapes their representation of the options but can also alter people's attitudinal risk preference. Schlegelmilch et al. examine boundary conditions for the emergence of negative recency effects during learning in decisions from experience. Finally, Spektor and Wulff disentangle different goals that shape people's information search in experience-based risky choice.

---

## **Metacognition and metamemory I**

Sofia Navarro-Baéz<sup>1</sup> & Franziska Ingendahl<sup>1</sup>

<sup>1</sup>*Technical University of Darmstadt, Germany*

Research on metacognition examines what people know about their cognitive processes. Specifically, metamemory refers to the ability to know and to assess memory in particular. The first part of this symposium on metacognition and metamemory presents recent insights on improving the accuracy of metacognition, alleviating metamemory illusions, and modeling metacognition. The first three talks focus on improving the accuracy of metacognition and on methods to alleviate

illusions: Navarro-Báez, Bröder, and Undorf show that metacognitive feedback informing about biased metacognition alleviates the stability bias. Zawadzka, Butowska-Buczyńska, and Hanczakowski reveal that item-by-item performance feedback on a first test increases awareness to the benefits of varied retrieval practice. Schaper, Hey, and Bayen provide insights on how to remedy the expectancy illusion on source memory by experience with a first study-test cycle that improves subsequent metamemory control. Focusing on the statistical modeling of metacognition, Schönung, Zühlke, Haag, and Kuhlmann examine the relationship between source memory and judgments of source memory using multinomial processing tree (MPT) modeling. Lastly, Leipold, Bröder, and Schnuerch present a novel approach using Bayesian hierarchical MPT models to directly relate metamemory judgments to underlying latent memory processes. Together, the talks present recent insights on improving the accuracy of metacognition and modeling approaches of metacognition.

---

## **Mind Meets Machine: Cognitive Insights into Human-Agent Interaction**

Jairo Perez-Osorio<sup>1</sup>, Basil Wahn<sup>1</sup> & Eva Wiese<sup>1</sup>

<sup>1</sup> *TU Berlin*

Recent advances in machine learning, robotics, and generative AI suggest that artificial agents are becoming increasingly capable of demonstrating social and communicative abilities. However, their effects on human cognition, emotion, and behavior in social interactions remain unclear. To explore these effects, research must incorporate models from cognitive psychology relevant to human-agent interaction (HAI), like mind perception and theory of mind, and use both subjective (motivation, emotion) and objective (behavioral, neural) measures. This symposium focuses on how human cognitive and neural processes unfold during interactions with artificial agents, examining their influence on attention, decision-making, and cognition. Through a series of talks, we will explore how artificial agents affect synchronization, cognitive offloading, trust, cognitive control, and perspective-taking. Key insights will highlight how humans rely on the perceived reliability of agents, whether through synchronization with robot behavior or trust in algorithm performance, and how human-like features foster collaboration. Furthermore, the symposium addresses the risk of trust miscalibration in human agent teams and automation biases, where overreliance or underuse of agents can undermine collaboration. By measuring neural and behavioral responses in real or simulated environments, the studies aim to advance our understanding of HAI and demonstrate how neuro-cognitive approaches can shed light on the effects of artificial agents on the human

mind. The session will advocate for inclusive, multidisciplinary research practices to improve our understanding of artificial agents' effects on the human mind and behavior.

---

## **From Berries to Brains: Insights into Search Behavior from Visual Foraging – Part II: Strategy & Decision Making**

Iris Wiegand<sup>1</sup>, Árni Kristjánsson<sup>2</sup>, Jan Tünnermann<sup>3</sup>

<sup>1</sup> *Radboud University Nijmegen*, <sup>2</sup> *University of Iceland*, <sup>3</sup> *University of Marburg*

When picking berries from bushes within a field of many bushes, the efficiency of this foraging search task is not only determined by the features and spatial distribution of the berries on a bush – as discussed in Part I of this symposium - but also by the decision when to leave a bush (“patch”) and continue search elsewhere (“patch-leaving”). Part II of the symposium will focus on the strategic choices and decisions involved in foraging behaviour. Wolfe and Hong will evaluate the validity of the influential “Marginal Value Theorem” (MVT) in predicting patch-leaving behaviour based on target intake rates. Bella-Fernández et al. show that analyzing search organisation improves the prediction of participants’ patch-leaving decision, complementing target intake rates as proposed by MVT. MacInnes et al. present a new “snap-shot” foraging task and computational model to understand the bottom-up and top-down effects on individual decisions within a sequence of selections within a patch. Finally, Gil-Gomez de Liaño and Pope & Wiegand will demonstrate how development and ageing influence behaviour in different variants of foraging tasks. The results highlight that (a)typical cognitive development during childhood and age-related decline have different effects on attentional, mnemonic, and strategic aspects of foraging behavior. Furthermore, their research demonstrates the potential of foraging tasks to be used in applied clinical neuropsychological settings. Together, the two symposia highlight the value of foraging tasks to study attention and decision-making processes, which is relevant for both fundamental and applied research on complex and realistic visual search.

---

## **Auditory cognition in interactive virtual environments**

Sabine Schlittmeier<sup>1</sup> & Stephan Getzmann<sup>2</sup>

<sup>1</sup> *RWTH Aachen University*, <sup>2</sup> *IfADo, TU Dortmund*

For psychological research into auditory perception and cognition and audiovisual interactions, the adaptation of traditional auditory cognition research methods to more immersive virtual and mixed reality (VR/MR) environments opens up new experimental possibilities. By taking advantage of advances in hardware and software, the contributions in this symposium are inspired by the DFG priority program AUDICTIVE (SPP 2236). Here, the overall goal is to create more realistic environments for studying natural behaviors and experiences, and to lay the groundwork for developing new paradigms that better mimic real-world auditory cognition. AUDICTIVE's key research questions include the application of auditory cognition theories in life-like VR environments, the improvement of audiovisual realism, and the identification of new quality evaluation methods for VR systems based on cognitive performance. The present contributions address the effects of acoustic and audiovisual stimuli on perception and cognition in real and virtual environments. They investigate distance perception in virtual reality, speech processing using EEG, the role of the vehicle sound for pedestrians' street-crossing decisions, memory and auditory performance in conversations, or neural processing of position changes in real and virtual space in different age groups.

---

## **From Babies to Semantics: Leveraging Language Models as Tools for Psycholinguistic Research**

Benjamin Gagl<sup>1</sup>

<sup>1</sup> *University of Cologne*

Here, we explore how one can use computational models primarily trained on text input, so-called language models, to investigate cognitive functions in language processing. First, Fritz Guenther investigates how the meaning of a word changes depending on the word context using semantic representations that emerge in language models. Next, using EEG, Katharina Menn investigates word frequency and context predictability effects in early language perception (starting at year one), with parameters extracted from language models prompted to generate text specifically for that age. Next, Hanna Woloszyn investigates, using corpus analysis, if generative language models can represent language used at a young age. Both talks contribute to the question if critical resources,

unavailable for children, that enable the investigation of cognitive processing in language can be derived from language models. The following talks investigate the multilingual facet of language models. Using eye movement measures, Sam Boeve investigates if context predictability derived from multi- or mono-lingual language models can better explain the predictability effect found in sentence reading. The final talk, by Marco Marelli, investigates how multilingual language models represent semantic units across languages, giving an insight into how language-specific or general semantic information is encoded. This selection of contributions will provide a diverse perspective on how language models can be used as tools, enabling several new possibilities in psycholinguistic research. The symposium aims to foster collaboration among experimental and cognitive psychologists, leveraging collective findings to advance our understanding of cognitive processes in language processing by using language models as a tool.

---

## **Cognitive Modeling and Conflict Tasks**

Valentin Koob<sup>1</sup> and Markus Janczyk<sup>1</sup>

<sup>1</sup> *University of Bremen*

In conflict tasks, such as the Simon, Eriksen flanker or Stroop tasks, a relevant and an irrelevant feature indicate either the same response or different responses in congruent and incongruent trials, respectively. In recent years, mathematical models of human cognition have become an increasingly valuable tool for exploring and investigating the precise mechanisms underlying decision making in general and performance in conflict tasks in particular. Standard diffusion models have been adapted to account for the specific features of conflict tasks. These adapted diffusion models allow, for example, the precise estimation of the time course and strength of the irrelevant feature's influence (Servant & Evans, 2022; Ulrich et al., 2015; White et al., 2011). However, these models also come with increased complexity compared to standard diffusion models. For example, they typically assume time-dependent drift rates that change their value within a trial.

This symposium will present recent methodological advances and theoretical insights from the application of cognitive models in the context of conflict tasks. The symposium will begin with a general introduction, followed by three contributions that present applications of cognitive models to provide new insights into the underlying processes in conflict tasks. The last two contributions are more methodologically oriented presentations on new advances in the efficient and practical application of conflict diffusion models.

## **Metacognition and metamemory II**

Sofia Navarro-Baéz<sup>1</sup> & Franziska Ingendahl<sup>1</sup>

<sup>1</sup>*Technical University of Darmstadt, Germany*

Following up on the first part the symposium, the second part of this symposium on metacognition and metamemory – people's knowledge about their cognitive processes in general and memory in specific – presents recent insights on the impact of metacognitive judgments, the role of metacognition for understanding memory, the cues that people rely on when making metacognitive judgments, and metacognitive aspects of problem solving. The first two talks focus on the impact of metacognitive judgments on memory: Schäfer, Halamish, and Undorf present selected findings from a meta-analysis on reactive effects of soliciting judgments of learning (JOLs) on memory. Undorf, Meer, and Halamish show that JOLs impact memory irrespective of response format or scale. Following up on the role of metacognitive judgments for understanding memory, Hanczakowski and colleagues reveal how JOLs can be used to examine age-related changes in memory. Focusing on the basis of metacognitive judgments, Schulz, Undorf, and Bröder provide insights in the dynamic integration of cues in JOLs. The symposium closes with a talk by Danek on metacognitive aspects of problem solving. Together, the talks present recent insights on the impact of metacognitive judgments on memory, their role for understanding cognitive processes.

---

## **Decoding hand gestures: Insights into meaning and communication**

Laura B. Hensel<sup>1</sup>

<sup>1</sup>*University of Glasgow*

Hand gestures are an integral part of human communication, fostering understanding, recall, and interpersonal connection (e.g., Clough & Duff, 2020). Gestures play a central role in shaping social interactions, often complementing or even substituting verbal communication. With the enormous range of possible gestures and the significant individual and contextual variations (Kendon, 1997; Kita, 2009), gestures represent a complex and multifaceted phenomenon that can vary significantly across different social and communicative contexts. This cross-disciplinary symposium brings together perspectives from psychology, linguistics, and computer science to explore the nuanced role of gestures in communication, considering them as more than just simple accompaniments to speech.

The talks in this symposium collectively examine both the broader communicative functions of gestures and diverse approaches to their study. They address the need to push beyond traditional boundaries in gesture research—whether by exploring gestures in specific cultural settings, reconsidering the relationship between gesture and speech, or applying new computational methods to analyze gesture use on a larger scale. By investigating metaphorical and ideational gestures or by integrating gesture-based communication into virtual agents, these talks reveal new insights into how gestures shape meaning and interaction across a range of communicative environments. Together, these contributions emphasize the dynamic and essential role of gestures in human interaction, offering theoretical and practical frameworks for understanding and investigating the complex role of gestures in communication.

---

## **Statistical Learning and its Role in Language and Reading Acquisition**

Tanja C. Roembke<sup>1</sup>, Xenia Schmalz<sup>2</sup>

<sup>1</sup> *RWTH Aachen University*, <sup>2</sup> *Ludwig-Maximilians-Universität München*

Statistical learning—the ability to extract regularities in one's environment—has been hypothesized to be instrumental in many areas of language and reading acquisition: For example, distributional cues such as transitional probabilities across syllables or co-occurrence statistics of words and their meanings have been found to be used in speech segmentation and word learning, respectively. While there is overall agreement that people are sensitive to these types of regularities, it is not clear to what extent they are predictive of language and reading outcomes. Thus, in this symposium, we will explore the utility and limitations of statistical learning as a mechanism of language and reading acquisition. In this context, we will also investigate how individual differences in language background may impact statistical learning ability. More specifically, we will look at the extent to which transitional probabilities across syllables are used for speech segmentation by German-learning infants (Contribution 1) and whether statistical word learning ability differs across monolinguals and bilinguals (Contribution 2). In Contribution 3, the orthographic knowledge of bilingual children is further examined. Moreover, we will explore to what extent sensitivity to orthographic regularities can explain variability in reading ability (Contribution 4). The causal mechanisms of the relationship between statistical learning and reading will be additionally examined in Contribution 5. The symposium will be rounded off by a discussion on the role of statistical learning in language and reading acquisition.

---



## **Temporal action-effect binding: Causes and implications**

Annika Klaffehn<sup>1</sup>

<sup>1</sup> *University of Würzburg*

Sensory processing is closely linked to and influenced by actions. As a notable example, the temporal binding effect refers to the observation that an action and its briefly delayed sensory feedback are estimated to be temporally shifted towards each other. This effect has attracted attention from both basic (e.g. cognitive mechanisms) and applied research (e.g. human-computer interaction). Over the past 20 years, temporal binding has been widely used as an implicit measure of the sense of agency. However, the relationship between temporal binding and sense of agency is controversial, primarily because the mechanisms of temporal binding are still unclear. In this symposium, we will discuss the dynamic impact of expectations and adaptation onto temporal estimates in the action-effect context and reevaluate the methodological soundness of the measure in light of interindividual differences and visual attention. Finally, we demonstrate temporal binding outside its conventional action-effect context, highlighting that, despite challenges, the phenomenon may prevail beyond being a mere methodological artefact.

---

## **From metal to mind: The pursuit of human-likeness in Human-Robot Interaction**

Katharina Kühne<sup>1</sup>

<sup>1</sup> *University of Potsdam*

As robotics and AI advance, the effort to make robots more human-like—both in appearance and behavior—raises important questions about how this affects human-robot interactions. While human-like features can improve communication and make interactions more intuitive, they also introduce challenges: How human-like should robots be? What design elements foster trust, empathy, and acceptance? In appearance, the Uncanny Valley phenomenon highlights the risk that increasing human-likeness can lead to discomfort when robots appear almost, but not quite, human. On the other hand, humans often anthropomorphize robots, attributing human traits based on specific cues, experiences, and individual characteristics. These aspects of anthropomorphism are closely related. This symposium explores the psychological and social effects of human-likeness in robots as well as the impact of human-related factors on robots' acceptance. Two contributions focus on robot features, examining communication style (Bing & Nazir), movement behavior and

embodiment (Pohl et al.). Another contribution addresses how human beliefs about human nature influence behavior toward robots (Pochwatko et al.). The final two presentations explore broader interaction dynamics, including replicating human social effects in human-robot dyads (Kühne et al.) and the emergence of the Uncanny Valley (Moore). By addressing these issues from different perspectives, we aim to gain insights into how robots can be designed to foster better interactions and enhance user acceptance.

---

## **Binding Information in Memory and Action Control – Part 1: Action Control/Memory**

Marcel R. Schreiner<sup>1</sup>

<sup>1</sup> *University of Würzburg*

When we encode or retrieve information, we relate this information to other information we have stored in memory. The term “binding” is broadly used to describe the association of different pieces of information or their integration into a joint representation. Binding is studied in various areas of cognitive psychology, including action control and different kinds of memory research relating to working, source, and episodic memory, although in a rather isolated manner. This double symposium brings together researchers from these different areas to showcase binding research in its breadth, to bridge research across different areas, and to hint at common mechanisms underlying binding in memory and action control.

This first part of the symposium focuses on research on binding originating from the domain of action control but involves ties to memory research. Further contributions originating from the domain of memory will be presented in the second part of the symposium. In this first part, the first contribution addresses modulations of cognitive control in task switching in relation to task-response binding. The second contribution investigates cognitive control under complex work settings in relation to the binding of control states. The third contribution deals with short-term effects of action-effect compatibility on action-effect binding. The fourth contribution addresses one-shot learning of action-effect relations and its modulation by action-effect compatibility. Finally, the fifth contribution investigates the role of anticipated effect features in action-effect binding based on anticipatory eye movements.

---

## How can we reliably and validly measure cognitive control?

Alodie Rey-Mermet<sup>1,2</sup> & Miriam Gade<sup>3</sup>

<sup>1</sup> *Vinzenz Pallotti University*, <sup>2</sup> *UniDistance Suisse*, <sup>3</sup> *Medical School Berlin*

Cognitive control has been referred to as the processes assumed to underlie goal-directed behavior and enable flexible adaptation in changing contexts. Recent findings have questioned the reliability of the typical measures used to assess cognitive control. These findings have started a debate about how to improve the reliability of these measures. However, the question of validity has, to some extent, been neglected. In the present symposium, we would like to discuss the solutions proposed to improve reliability, but from the perspective of validity. For instance, are we still measuring cognitive control after a large number of trials? Or does cognitive control only occur at the beginning, when the task is still novel? How should we select trials to ensure that measures of cognitive control are both reliable and valid? In the first talk, we will present the current state of the research. In the following four talks, we invite our speakers to present their work on how to improve the reliability and validity of the cognitive-control measures on the one hand or offer further thoughts about the dilemma of validity and reliability itself. Finally, we plan a discussion between the speakers and audience members to address what actually enables goal-directed behavior and how best to measure it.

---

## Numerical Assimilation in Anchoring, Advice Taking, and Hindsight Bias

Tobias R. Rebholz<sup>1</sup> & Maren Mayer<sup>2</sup>

<sup>1</sup> *University of Tübingen*, <sup>2</sup> *Leibniz-Institut für Wissensmedien Tübingen*

People typically face a variety of external influences on their numerical judgments. In this symposium, we take a holistic view of numerical assimilation phenomena by integrating research on anchoring, advice taking, and hindsight bias. Despite many commonalities, anchoring effects are typically largely unreliable, advice taking effects can be measured reliably, and hindsight bias exhibits moderate reliability. In an overall introduction, Tobias Rebholz presents a common framework for these three distinct but related phenomena, which also allows to systematically investigate differences in reliability. In an extension of the traditional advice taking paradigm, Julia Bengelsdorf tests numerical precision as an explanatory mechanism for why judges follow aggregated advice from multiple advisors more than a single piece of advice. As memory plays an

important role in assessing advice validity but has been largely neglected in this research, Florian Scholten presents a novel paradigm that integrates implicit directed forgetting. Interestingly, participants attempt to process and later correct invalid information rather than ignore it in their final judgments. Despite creating optimal conditions for algorithm aversion to emerge, Thomas Schultze presents findings of algorithm appreciation in the judge-advisor system that were unaffected by the addition of a human-in-the-loop. Finally, Maren Mayer shows that experts are indeed less anchored compared to novices, but there seems to be no effect of the relevance of the presented numerical values in two experiments. In a general discussion, we aim to encourage the bridging of gaps in research on numerical assimilation by weaving together insights from these distinct but related phenomena.

---

## **Unveiling the Future of Masked Priming: Innovations, Challenges, and Collaborative Pathways**

Guido Hesselmann<sup>1</sup>

<sup>1</sup> *Psychologische Hochschule Berlin (PHB)*

The symposium, titled “Unveiling the Future of Masked Priming: Innovations, Challenges, and Collaborative Pathways”, will explore recent developments and methodological challenges in the study of unconscious cognition, with a focus on masked priming paradigms. Masked priming research has significantly shaped and continues to shape our understanding of unconscious processing and consciousness itself.

The five talks highlight critical advances in measuring visual awareness, task complexity, and the interaction between direct and indirect measures of prime processing. The first talk compares subjective and objective awareness measures in masked priming, revealing a convergence between psychophysical and introspective methods. This challenges the notion that subjective measures should be preferred for their specificity. The second presentation investigates the dual-task nature of masked priming paradigms with trial-wise prime visibility judgments, exploring how task modality and complexity influence response times, error rates, and priming effects. The third talk critically examines the Perceptual Awareness Scale (PAS), showing how its trial-by-trial assessments can disrupt priming effects, questioning its utility in unconscious processing studies. The fourth presentation delves into the methodology of demonstrating unconscious priming, advocating for a robust approach based on double dissociation patterns and indirect task advantages. Finally, the fifth talk critiques recently proposed “best practices” in unconscious

cognition, highlighting issues in post-hoc trial selection and the risks of misattributing unconscious processing to biased sampling.

The symposium will conclude with a general discussion involving both the speakers and the audience, encouraging a collaborative exploration of these innovative ideas and fostering future research directions in the field.

---

## **Large language models in the psychological research**

Dirk U. Wulff<sup>1,2</sup>

<sup>1</sup> Max Planck Institute for Human Development, <sup>2</sup> University of Basel

Large language models (LLMs) have immense potential to revolutionize the field of psychological sciences by streamlining and enhancing the entire research cycle—from conceptualization to data analysis—while also opening up new avenues of inquiry into the ethical, social, and cognitive implications of using LLMs in daily life. This introduction provides an overview of the foundational principles behind the successes (and limitations) of LLMs and offers a detailed discussion of their current applications in advancing psychological research, as well as their future possibilities. Additionally, it discusses ethical and practical challenges that arise from integrating LLMs into research and society, underscoring the pivotal role that psychological science can play in the development and evaluation of large language models and artificial intelligence.

---

## **The Future of TVA Part 1: Cognitive processes**

Ingrid Scharlau<sup>1</sup>, Jan Tünnermann<sup>2</sup>, Kathrin Finke<sup>3</sup>

<sup>1</sup>Paderborn University, <sup>2</sup> University of Marburg, <sup>3</sup> University of Jena

As the Theory of Visual Attention (TVA) continues to provide a rigorous, quantitative framework for understanding attentional processes, the future of its applications in psychology remains a pivotal area of exploration. This symposium – part of a double symposium on the future of TVA – assembles a series of talks that focus on new and important questions concerning the network of processes that TVA addresses. As a start, Schneider and Poth revisit one of TVA's core mechanisms, filtering and “pigeonholing” of incoming visual information, reconceptualizing it for the future. Shalev discusses TVA processes within the network of other cognitive mechanisms. He examines how recent and long-term experiences with object locations, identities, reward value, and

timing interact with attentional resource allocation. Starting from the observation that TVA does not account for a range of phenomena related to awareness Sørensen closes this gap by exploring template tuning as a basis for conscious perception and thus offering a TVA-based perspective on the relationship between attention and awareness. Finke focuses on the area of aging by discussing TVA-based assessments and interventions in aging, focusing on TVA's future role in clinical research and on how TVA might help development of an integrative framework for understanding neurocognitive changes related with aging and developing strategies to preserve cognitive health in an ageing population.

---

## **Frequency, Fluency, and Evaluative Conditioning**

Claudine Pulm<sup>1</sup>

<sup>1</sup> *Ruhr University Bochum*

This symposium focuses on evaluative conditioning (EC), the change in liking of a conditioned stimulus (CS) due to its pairing with a positive or negative unconditioned stimulus (US). It brings together new insights into how features of the stimuli and their presentation, like processing fluency, stimulus repetition, and frequency, shape the strength and nature of EC effects. The first talk will explore the issue of valence asymmetries in EC, highlighting the importance of the nature and ratio of positive and negative USs. The second talk shifts focus to attitude certainty as an EC outcome, exploring how factors like repetition and frequency contribute to the certainty with which individuals hold their attitudes. The third talk focuses on the effects of CS-US pairing frequency, investigating whether more frequent pairings result in stronger conditioning effects and how mere exposure may contribute to these outcomes. The fourth talk investigates how the fluency of the CS affects EC, showing that more fluent stimuli lead to stronger conditioning effects. Finally, the last talk explores mere exposure effects and how they may contribute to the understanding of EC extinction in more detail. Together, these talks provide a comprehensive exploration of how stimulus characteristics and exposure frequency contribute to EC, offering new directions for both theoretical understanding and practical applications.

---

## **Binding Information in Memory and Action Control – Part 2: Memory/Action Control**

Marcel R. Schreiner<sup>1</sup>

<sup>1</sup> *University of Würzburg*

When we encode or retrieve information, we relate this information to other information we have stored in memory. The term “binding” is broadly used to describe the association of different pieces of information or their integration into a joint representation. Binding is studied in various areas of cognitive psychology, including action control and different kinds of memory research relating to working, source, and episodic memory, although in a rather isolated manner. This double symposium brings together researchers from these different areas to showcase binding research in its breadth, to bridge research across different areas, and to hint at common mechanisms underlying binding in memory and action control.

This second part of the symposium focuses on research on binding originating from the domain of memory (including working, source, and episodic memory) but involves ties to research on action control. Further contributions originating from the domain of action control will be presented in the first part of the symposium. In this second part, the first contribution investigates declarative and procedural bindings in working memory. The second contribution involves a neurophysiological investigation of binding and updating processes in working memory. The third contribution addresses the influence of prior knowledge on visual working memory representations. The fourth contribution investigates whether source emotionality and self-referencing encoding strategies can alleviate source memory impairments in older adults. Finally, the fifth contribution deals with binding in episodic memory, particularly the role of sleep in shaping episodic memory representations.

---

### **Source memory**

Nikoletta Symeonidou<sup>1</sup> & Désirée N. Schönung<sup>1</sup>

<sup>1</sup> *University of Mannheim*

Source memory refers to the ability to recall the origin of information (e.g., “Where did I read the latest news?”). In daily life, intact source memory can be crucial for accurately evaluating the validity and credibility of received information. Acknowledging its importance, this symposium brings together five researchers who explore various factors that enhance or impair source memory. Utilizing a joint mathematical framework (i.e., multinomial processing tree models)



to distinguish source memory from guessing processes, the following topics will be addressed: First, Ülker and Bodemer explore whether focusing learners' attention on source information improves source memory without compromising overall learning in a collaborative learning setting. Next, Kroneisen questions whether previous findings showing better source memory for relevant interaction partners are valid and investigates how the realism of utilized materials might impact these findings. Following this, Ford and Nieznański examine whether feedback on a statement's truth and importance is preferably encoded in source memory, observing enhanced joint retrieval for "true" and "important" feedback. Staying in the realm of memory for truth and falsity, Nadarevic and Fazio analyze how the timing of fact-checking feedback influences source memory, revealing that feedback is remembered best when presented after the critical statement. Finally, Kuhlmann, Schicker, Shakoor, and Erdfelder investigate the role of sleep in preserving older adults' source memory, showing that slow-wave sleep embedded within sleep cycles benefits source memory. The results and implications of each contribution will be discussed in depth.

---

## **The Future of TVA Part 2: Modeling**

Kathrin Finke<sup>1</sup>, Jan Tünnermann<sup>2</sup>, Ingrid Scharlau<sup>3</sup>

<sup>1</sup> *University of Jena*, <sup>2</sup> *University of Marburg*, <sup>3</sup> *Paderborn University*

The Theory of Visual Attention (TVA) has provided psychology with a rigorous, quantitative framework for understanding attentional processes. This symposium – part of a double symposium on the future of TVA – assembles a series of talks that discuss how TVA can be advanced as a model in order to be able to face future challenges. Rabe and Kyllingsbæk propose a novel Bayesian framework for obtaining TVA parameters that addresses limitations of previous TVA implementations and includes promising elements such as hierarchical modeling. Hilla explores the application of TVA in modeling multitasking performance, pushing TVA forward to complex attentional dynamics. Biermeier and Scharlau investigate how TVA parameters generalize across experimental paradigms (whole report and temporal-order judgments), a challenge TVA must overcome. Dupont, Petersen and Vangkilde present recent advances in TVA-based modeling to account for distinct effects of tonic and phasic alertness on attentional performance. The symposium concludes with a discussion on how TVA can evolve as a powerful tool for addressing future challenges in attentional research.

---

## **Do you remember? Current topics in experimental memory research**

Ryan Hackländer<sup>1</sup> & Magdalena Abel<sup>2</sup>

<sup>1</sup> *University of Hildesheim*, <sup>2</sup> *University of Technology Nuremberg*

Experimental research approaches the scientific study of human memory from many different angles. This symposium will bring together memory researchers that pursue different research questions. In the first part of the symposium, two presentations will focus on the act of memory retrieval and its influence on subsequent remembering. The first talk by Simone Malejka will consider classical testing effects and address how retrieving previously encoded material affects memory for central and contextual information. The second talk by Oliver Kliegl will cover pretesting effects and how repeated guessing attempts before learning can benefit memory. In the second part of the symposium, the remaining three presentations will focus on memory updating. The third talk by Marius Böltzig will look into prediction errors and how they influence memory representations. The fourth talk by Magdalena Abel will deal with memory updating in list-method directed forgetting and the role of prolonged retention intervals after initial encoding. Finally, the fifth talk by Ryan Hackländer will focus on item-method directed forgetting and the cognitive mechanisms that may (or may not) mediate changes in memory. In addition to the five talks, a final discussion slot will provide opportunity to discuss overlap and joint themes across studies, as well as potential avenues for future research.

---

## **Challenges and new avenues in the research on imitative behavior**

Danna Oomen<sup>1</sup>, Carina G. Giesen<sup>2</sup>, & Oliver Genschow<sup>1</sup>

<sup>1</sup> *Leuphana University Lüneburg*, <sup>2</sup> *Health and Medical University Erfurt*

Humans have an automatic tendency to imitate others. Previous research suggests that this ubiquitous phenomenon fulfills an important social function by bonding people together. Given that imitation is a social phenomenon, theories postulate that social variables should facilitate people's tendency to imitate each other. This symposium presents research that goes beyond the basic understanding of imitation by challenging and extending these theories on automatic imitation. The first three talks indicate that social variables may not influence imitative behavior as strongly as previously assumed. The first talk shows that imitation is a global phenomenon only marginally influenced by cultural differences. The second talk examines two competing theories: one suggesting tech-savvy individuals are more inclined to imitate robots, and another proposing their

knowledge makes them less likely to attribute human-like qualities to robots, reducing imitation. The third talk continues exploring social interactions by examining how individuals' expectations about interacting with another human versus AI influence imitative action regulation tendencies. While the first three talks critically reflect on existing theories of imitative behavior, the final two presentations describe new, promising avenues for research. The fourth presentation shows that imitation is perceived quite differently from a third-person perspective compared to a first-person perspective. Specifically, third-party observers view mimicked (i.e., people who are mimicked) as more competent than imitators (i.e., people who imitate). Finally, the fifth talk demonstrates how a classical automatic imitation task can be used to investigate the headwind-tailwind hypothesis, which posits that people are more aware of challenges than of their blessings.

---

## **Neuromodulation and cognitive functioning: Insights from experimental psychopharmacology**

Kaja Faßbender<sup>1</sup>

<sup>1</sup> *University of Bonn*

Experimental psychopharmacology investigates effects of pharmacological agents on human experience and behaviour. Thereby, conclusions may be drawn about neurotransmitter systems, their involvement in cognition and in normal and dysfunctional processes. Here, we aim to give an insight into various projects that all have the method of experimental psychopharmacology in common. First, Kaja Faßbender (Bonn) will introduce fundamental concepts of research in experimental psychopharmacology and present results on the role of the primary inhibitory neurotransmitter  $\gamma$ -aminobutyric acid (GABA) in selective attention. Philine Baumert (Bonn) will extend findings on the GABAergic system by presenting data on benzodiazepine effects on saccadic eye movements in prosaccade and free viewing tasks, along with the use of experimental neuromodulation in biomarker research. Subsequently, Monja Froböse (Düsseldorf) will concentrate on cholinergic, GABAergic and glutamatergic modulation of reward-guided learning under different levels of uncertainty as assessed in two independent studies. Astrid Prochnow (Dresden) will then present results on the effect of methylphenidate on event file binding in response inhibition and event segmentation behaviour. Results show how experimental pharmacological manipulation of the catecholaminergic system can be used to reveal similarities and differences between distinct cognitive functions. Finally, Yu-Shiuan Lin (Boston) will present findings on the effects of the adenosine receptor antagonist caffeine on dopaminergic cognitive functions, thereby providing a perspective on adenosine-dopamine interactions. Overall, the symposium will provide valuable

insights into ongoing experimental psychopharmacological research by addressing a broad spectrum of neurotransmitter systems and cognitive functions.

---

## **Emotion regulation: Neural underpinnings and associations with executive functions**

Ulrike Basten<sup>1</sup> & Julia Karbach<sup>1</sup>

<sup>1</sup> *RPTU Kaiserslautern-Landau*

This symposium examines the role of executive functions for emotion regulation (ER). All studies presented use experimental methods to investigate individual differences in emotion regulation and/or executive functions. Regarding emotion regulation, the symposium considers individual differences in ER tendency, capacity, and flexibility. ER capacity is assessed via subjective affect ratings, psychophysiological measures (EMG), and neural activity (EEG and fMRI). The first two studies relate executive functions and behavioral measures of ER. (1) Pruessner et al. present original experimental and meta-analytic evidence for an association of ER capacity with working memory updating. (2) De la Fuente et al. suggest that executive functions are particularly important for ER flexibility. The following two studies investigate neural correlates of ER. (3) Plückebaum et al. find that ER tendency is associated with the individual capacity to reduce the amplitude of the late positive potential (LPP) in EEG. (4) Stelzel et al. show that lower attention control is associated with higher frontoparietal brain activation during ER as measured with fMRI. Finally, (5) Gentsch et al. explore individual differences in ER capacity by comparing ER-related changes in facial muscular responses measured by EMG in bipolar patients and healthy controls. Across talks, the symposium will put the different experimental findings on individual differences in ER, their correlates in executive functions and neuronal activity, and their implications for psychopathology in relation.

---

## **Field experiments with micro-randomized trials: Applications from research on physical activity, self-regulated learning, and environmental psychology**

Florian Schmiedek<sup>1</sup>

<sup>1</sup> *DIPF | Leibniz Institute for Research and Information in Education*

Field experiments employing experimental manipulations of behavior at the within-person level are more and more frequently applied in psychology. In micro-randomized trials (MRTs), prompts to show a certain behavior are randomly provided (or not) at defined timepoints over a phase of intensive longitudinal measurement, often employing ambulatory assessment methods. Advantages over laboratory-based between-person designs are gains in ecological validity because behavior and outcomes are assessed in natural environments, the possibility to investigate moderating contextual factors, and the potential to investigate individual differences in causal effects. This symposium will showcase four applications of such study designs from different subdisciplines of psychology. In the introduction, Florian Schmiedek will highlight advantages of using MRTs, present different study designs, and discuss challenges regarding implementation and data analysis. Marco Giurghi et al. investigate the effects of short physical activity breaks on affective well-being and cognitive performance using a MRT with 222 university employees over two weeks. Lena Wieland et al. use a MRT over 20 days to investigate the effects of two brief interventions – a physical activity intervention and a breathing exercise – on affective wellbeing and cognitive performance in 245 fifth- and sixth graders. Mirijam Schaaf et al. examine the effectiveness of implementation intentions for self-regulated learning with a vocabulary learning app in 357 children with a MRT of 42 days. Silvia Caldaroni et al. investigate how encouragements to show pro-environmental behavior can influence the experience of closeness to others as a facet of well-being in 63 younger adults using a MRT over 21 days.

---

## **Current Developments in Evaluative Conditioning I – From the Lab to the Real World**

Moritz Ingendahl<sup>1</sup>

<sup>1</sup> *Ruhr University Bochum*

This symposium focuses on evaluative conditioning (EC), the change in liking of a conditioned stimulus (CS) due to its pairing with a positive or negative unconditioned stimulus (US).

Part I will begin with a brief introduction to the topic, followed by four talks focusing on how EC effects emerge in laboratory versus real-life settings and the challenges associated with studying EC. The first talk discusses how EC affects basic cognitive processes – peripheral visual attention. With the second and third talk, we move to real-life settings, testing to what extent EC effects emerge in less controlled situations, including incidental stimulus pairings in a lecture hall or brand placements in video games. The final talk of the first part will critically discuss demand effects as a core challenge in EC research and re-assess recent claims downplaying demand effects in EC. Part

I will finish with a brief discussion and integration of the talks. Further insights into the cognitive processes underlying EC will be presented in Part II of the symposium.

---

## **Goal-Oriented Information Processing: Adaptive Working Memory**

*Sahcan Özdemir<sup>1</sup>*

*<sup>1</sup> Leibniz Research Centre for Working Environment and Human Factors*

Working memory (WM) has long been investigated as a retrospective mechanism. However, recent research extends the WM framework to a prospective scale, viewing WM as an adaptive system for information maintenance through goal-directed behavior. This symposium explores how WM adapts to action-related processes driven by task goals. To provide comprehensive insights, we will examine different WM processes across various levels of analysis. The talks will cover topics such as action-induced WM updating, format changes in WM representations in relation to recall demands, reliance on long-term memory, influence of action on serial dependence, and saccadic selection between WM and perception. These topics will be approached using a variety of methodologies, including saccadic eye movements, BOLD signals, behavioral measures, and EEG. As a result, the symposium emphasizes that to understand WM's emergence and relation with goal-directed behavior, we should look more closely at the mechanisms that adapt to the needs of environmental interactions.

---

## **Experimental aesthetics I: Different fields**

Thomas Jacobsen<sup>1</sup>

*<sup>1</sup> Helmut Schmidt University / University of the Federal Armed Forces Hamburg*

This session is focused on the ways in which aesthetic perception is shaped by multisensory integration and cognitive processes. Through a detailed examination of texture perception, musical taste, and visual forms like curvature and body proportions, this session will advance our understanding of how individuals process and synthesize multisensory information in aesthetic contexts. It also explores the complex relationship between art, morality, and social norms, thereby addressing how these factors shape aesthetic experience and judgment. The research presented not only enriches theoretical perspectives but also provides empirical insights into the universal and culturally specific aspects of aesthetic experience across different fields. Moreover, by reflecting on

how viewers engage with art that provokes moral or ethical considerations, this session highlights the evolving role of art in shaping societal values and expanding the boundaries of moral behavior. The discussions aim to deepen our understanding of the interplay between art, ethics, and social context in contemporary aesthetic experiences.

---

## **Shaping Cognition: The Interplay of Language, Space, and Thought**

Karin M. Bausenhardt<sup>1</sup>, Rolf Ulrich<sup>1</sup>, & Barbara Kaup<sup>1</sup>

<sup>1</sup> *University of Tübingen*

The domains of language, space, and thought have been linked to each other in numerous influential theoretical frameworks. Linguistic relativity, for instance, posits that language shapes thought processes (as per the Sapir-Whorf hypothesis), a prime example being the notion that different languages promote different spatial frames of reference, thus impacting on spatial reasoning and orientation. Space may shape the representation of abstract concepts through conceptual metaphoric mapping (Lakoff & Johnson, 1980), which expresses itself on the linguistic level, and by directly constraining and informing the content of mental representations, as implicated by the proposal of distance-dependency of mental construals (Trope & Liberman, 2010). In the present symposium, we will thus explore the intricate relations between language, space and thought from psychological, linguistic and anthropological perspectives. Dedre Gentner discusses how relational language supports abstract reasoning, comparison, and metaphorical extension. Gary Lupyan argues that language acts as a categorical overlay on thought, structuring perception and conceptualization beyond simple word-concept mappings. Karin Bausenhardt et al. explore how spatial distance fosters abstraction and generalization, while proximal contexts promote more concrete thinking. Michael Ramscar et al. discuss how contextual alignment between referents fosters the acquisition of morphological structures in learning. Finally, Jürgen Bohnemeyer examines how language diffuses cognitive practices, particularly through spatial reference frames, highlighting the role of culture in shaping cognition. Together, these talks provide interdisciplinary insights into how language, space, and thought are intertwined, advancing an integrated perspective on how linguistic and spatial experiences interact with our perception and understanding of the world.

---



## **Current Developments in Evaluative Conditioning II – Control and Memory**

Moritz Ingendahl<sup>1</sup>

<sup>1</sup> *Ruhr University Bochum*

This symposium focuses on evaluative conditioning (EC), the change in liking of a conditioned stimulus (CS) due to its pairing with a positive or negative unconditioned stimulus (US).

After a brief introduction to EC in laboratory and real-life settings in Part I of the symposium, Part II turns to the role of control and memory processes in EC effects. The first talk explores how different stimulus modalities (verbal vs. visual) affect the controllability of EC effects, while the second talk will discuss children's vulnerability to EC effects. Next, the symposium turns to memory processes, with a talk on a recent experimental procedure to identify memory-independent EC effects. The fourth talk deals with how encoding time influences the memory of relational information. Finally, the symposium will conclude with a talk on memory specificity in EC generalization effects, followed by a brief discussion and integration of the talks.

---

## **Levels of orthographic representation: From retina to word form**

Jack E. Taylor<sup>1</sup> & Janos Pauli<sup>2</sup>

<sup>1</sup> *Goethe University Frankfurt*, <sup>2</sup> *University of Cologne*

Orthographic processing provides a vital bridge between vision and language that enables visual word recognition and, ultimately, reading. While experimental findings like letter transposition effects are well-accounted for by model features like flexibility in letter position coding, less focus has previously been given to modeling more low-level, visual processing. This symposium brings together researchers with varying perspectives who have used experimental and modeling approaches to provide insights into (1) lower-level orthographic processing, and (2) how such low-level effects relate to higher-level word-form and reading processes. Together, the talks delineate a hierarchy of orthographic processing, from more visual representations, to more abstract, invariant orthographic representations, and suggest avenues for modeling this progression. The first talk introduces research showing that artificial neural networks trained to recognize words from images develop representations that align with those of neurocognitive models and humans. The second talk presents experimental findings that show just how flexible letter recognition is in readers, and highlights insights and constraints this provides for models of word recognition. The third talk

outlines a computational framework for capturing orthographic processing, with evidence that it aligns with neural representations of letters in humans. The fourth talk presents a predictive coding approach to modeling letter perception and recognition processes from images of letters, showing a high degree of alignment with human behaviour. The fifth and final talk examines insights into orthographic processing in humans revealed by experiments in and models of visual word recognition behaviour of non-human animals.

---

## **Experimental aesthetics II: Past and future**

Thomas Jacobsen<sup>1</sup>

<sup>1</sup> *Helmut Schmidt University / University of the Federal Armed Forces Hamburg*

This session focuses on the cultural and historical dimensions of aesthetic appreciation, perception, and experience, thereby offering a thorough understanding of how aesthetic values and judgments are shaped across time and cultures. To be specific, it emphasizes the key historical contributions to the field, providing fresh insights into how experimental aesthetics were studied in the past and their relevance today. The symposium also compares aesthetic experiences across different cultural contexts and considers the contribution of art to people's well-being. By examining both historical and contemporary perspectives, this session illuminates the profound ways in which culture and history inform our current understanding of experimental aesthetics, contributing to a more global and inclusive view of aesthetic theory and practice.

This symposium engages with the cultural and historical dimensions of aesthetic perception, offering a rich exploration of how aesthetic values and judgments are shaped across time and cultures. It revisits key historical contributions to the field, providing fresh insights into how aesthetic preferences were studied in the past and their relevance today. The symposium also compares aesthetic experiences across different cultural contexts, revealing how notions of beauty, art, and identity are influenced by cultural traditions. Additionally, the role of art in promoting well-being is considered, particularly its impact on individuals' emotional health within specific cultural settings. By examining both historical and contemporary perspectives, this session illuminates the profound ways in which culture and history inform our understanding of aesthetics, contributing to a more global and inclusive view of aesthetic theory and practice.

---

## **Abstract Representations in Neural Architectures: From Human Cognition to Artificial Intelligence**

Yee Lee Shing<sup>1</sup>

<sup>1</sup> *Goethe University Frankfurt*

How knowledge is represented in the human mind and brain is one of the most fundamental questions of cognitive and brain sciences. It is central to many domains of cognition - from visual perception and object recognition, learning of regularities and semantic knowledge about the world, to language processing. However, an overarching framework that is rich enough to capture knowledge representations at various depths and levels of abstraction is still lacking. In this regard, recent developments in artificial intelligence (AI), in particular Deep Neural Networks (DNNs), are making promising advances and will be exemplified in the talks of this symposium. In Talk 1, Triesch will present novel learning approaches for DNNs that exploit the temporal and/or multimodal structure of sensory information during infants' extended interactions with objects. In Talk 2, Schommartz will present how gaze fixations during natural scene viewing differ between children and adults, and how predictions from AI models can help to understand the age differences. In Talk 3, Nicholls will present a study that examines to what extent hierarchical scene knowledge is represented on a neural level during object recognition. In Talk 4, Çelik will present a study that demonstrates LLMs as useful tools to semantically annotate a large pool of words out-of-context and modelling brain data while subjects listen to this audiobook. At the end, we will discuss to what extent such concerted efforts of psychologists and computer scientists improve the understanding of how representations emerge and are coded across different types of neural architecture.

---

## **Dissociating effects of episodic retrieval of recent stimulus-response episodes versus contingency awareness as a source of learning**

Matthäus Rudolph<sup>1</sup> & Carina G. Giesen<sup>2</sup>

<sup>1</sup> *FSU Jena*, <sup>2</sup> *HMU Erfurt*

Recent findings indicate that contingency learning effects can be the outcome of two independent processes, namely episodic retrieval and contingency awareness. The former process is characterized by recent evidence showing that contingency learning effects are often best characterized by a retrieval of the most recent stimulus-response (S-R) episode ("law of recency", Giesen et al., 2020), which reflect only transient links or bindings between stimuli and responses.

Importantly, controlling for episodic retrieval of past S-R episodes will not always eliminate effects of contingency learning, as a residual (genuine) learning effect will remain (Rudolph & Rothermund, 2024). These genuine learning effects are best explained by propositional knowledge and beliefs that can be further modulated by manipulations of contingency awareness and (fake) instructions. In the present symposium, we will present findings from a broad range of experimental paradigms designed to dissociate the effects of awareness-based learning and recency-based retrieval. In addition, we will demonstrate that factors that play a major role in learning - such as contingency awareness, instructed knowledge, and affective consequences - do *not* modulate transient S-R binding and retrieval effects, suggesting that binding and retrieval is impervious to these influences. The findings stem from a diverse range of research domains such as evaluative conditioning, color-word contingency learning, valence contingency learning, and stimulus-response binding. We will discuss possible implications for the relationship between binding and learning.

---

## **Cognitive-motor interference: How cognitive processing demands can affect postural control processes**

Anton Koger<sup>1</sup>

<sup>1</sup> *RWTH Aachen University*

Research on cognitive-motor interference highlights the complex relationship between cognitive processing demands and postural control. In this symposium, we will discuss how engaging in tasks requiring cognitive control, such as conflict resolution, dual-tasking, and mental rotation, influences postural control processes during standing. By focusing on an event-related approach that allows high temporal resolution, the individual talks aim to provide a deeper understanding of how cognitive processes influence postural control processes that occur in the range of sub-seconds. The first talk examines how cognitive conflict resolution and related inhibitory processes influence postural control processes during standing by using an event-related approach. The second talk introduces *forceplate*, a novel R package tailored for processing raw force-plate data and integrating events from concurrent cognitive tasks, providing researchers with an efficient and easy-to-use tool for event-related analysis of postural data. In the third talk, the analysis of event-related, continuous force-plate data is extended using cluster-based permutation analysis to assess how dual-task demands impact postural control processes. The fourth talk combines the event-related approach and the cluster-based permutation analysis during a Flanker Task to examine how cognitive conflict demands alter the dynamics of postural control processes. The final talk explores how egocentric mental rotation can affect postural stability, and whether mental rotations lead to corresponding

rotations around the same axis. Taken together, these contributions demonstrate the benefits of adopting an event-related approach to force-plate data and provide tools for understanding how cognitive processing demands.

---

## **From behavioral eye-tracking analysis to cognitive imaging: mechanisms of attention and learning in search tasks**

Artyom Zinchenko<sup>1</sup>

<sup>1</sup> *Ludwigs-Maximilians-University Munich*

In our symposium, we will present new evidence coming from eye-tracking, virtual reality, EEG, and fMRI that shows how healthy human participants utilize visual and auditory contextual cues and effective attentional mechanisms to locate targets within complex search environments. We use the contextual-cueing paradigm, where prior experience with a stimulus facilitates search in future occasions. Our findings indicate that contextual facilitation is brought about by two attention mechanisms (target facilitation and distractor suppression), with the relative interplay of these mechanisms being set by the reliability of target-context mappings. We also find that there are distinct neural suppression mechanisms for distractors sharing target features ("within-dimension") versus those with different features ("cross-dimension"). Further, we report a contextual-cueing effect in an auditory search task as well as with 3D vision, where in the latter, contextual repetitions might lead to acquiring procedural knowledge about how to effectively scan the 3D letter displays (such as from the left to right hemifield), with acquired visual scanning also impacting on contextual adaptation (following a target relocation event). A novel visual scanpath analysis of 2D letter arrays also supports an account according to which display-general procedural memories contribute to the cueing effect. Overall, our new results provide a glimpse into the intricate workings of selective attention, highlighting the roles of contextual learning and distractor suppression with both abstract (2D) and ecologically valid (3D) stimuli when searching both visual and auditory environments.

---

## **Real fears in virtual worlds: behavior, physiology, and neural mechanisms**

Olivier de Vries<sup>1</sup>

<sup>1</sup> *University of Bonn*

Psychology has a long history of studying fear and anxiety under laboratory-controlled conditions, using various tasks centered around threat and uncertainty. However, traditional research methods have equally long been criticized for being too simplistic and lacking critical naturalistic elements. Virtual reality (VR) holds the promise of overcoming these issues, but still accounts for only a small proportion of studies on the subject. This symposium highlights insights into anxiety that have been obtained by VR studies and paves the way for future work.

This symposium features four speakers that have each developed a novel method to study anxiety in VR. First, Lukas Kornemann will present his work on the conditions, both internal and external to the individual, that are most strongly associated with anxiety and related subjective experiences. Then, Sabrina Gado will showcase two studies demonstrating individual differences in an immersive social conditioning task. Alexandros Kastrinogiannis will present individual differences in how anxious individuals balance threats and prospective rewards. Finally, Pauline Dibbets will present various studies in which participants learned and generalized information about threats across various naturalistic environments.

As equipment and software for research in VR becomes more accessible, we find ourselves at a natural moment to pause and reflect on how it has thus far contributed to our understanding of anxiety. This symposium will therefore conclude with a discussion on promises and pitfalls, the utility of theories and concepts that were born out of earlier research paradigms, and the potential for clinical translation.

---

## **Perception, Decision Making, and Action in Sport**

Iris Güldenpenning<sup>1</sup>

<sup>1</sup> *Paderborn University*

In interactive sport (e.g., team sport), highly time-restricted situations require sportsmen and sportswomen to early anticipate the observed actions of athletes, to make decisions, and to execute, or even inhibit, corresponding actions. The first talk is dedicated to the question whether referees' decision making in soccer (i.e., offside decisions) is positively biased for the home team. Or can seemingly biased offside decisions also be explained by perceptual processes? The second

and the third talks deal with action inhibition: The ability to inhibit an already planned action plays an important role in sport, for example, to avoid an injury or because an opponent has provoked an incorrect action through deception. Different methodological approaches are chosen in the talks, namely the well-known stop-signal task (second talk), and the anticipation-response inhibition (ARI) task (third talk). In the fourth talk, the head fake in basketball is investigated, specifically, the costs when performing such a deceptive movement. Here, fake production costs occur as turning the head and passing the ball must be executed in opposite directions. Therefore, fake production costs of the head fake reflect response-response incompatibility costs. Are these costs higher if a social partner is to be deceived (social costs)? The fifth talk explores gender differences in dual-task costs between a motor task (frequency tapping) and a cognitive task (Stroop task) and takes up the current demand for the consideration of gender in scientific studies.

---

## ORIGINAL RESEARCH TALKS

### NUMERICAL ASSIMILATION IN ANCHORING, ADVICE TAKING, AND HINDSIGHT BIAS

---

#### Does algorithm aversion occur in advice taking?

Thomas Schultze <sup>1, 2\*</sup>, Samantha Darrah <sup>2</sup>

<sup>1</sup> *Otto-Friedrich-Universität Bamberg*, <sup>2</sup> *Queen's University Belfast*

The growing abilities of algorithms and their increased accessibility have led researchers to study whether and to which extent decision-makers rely on algorithmic advice. One phenomenon that has garnered substantial interest is algorithm aversion. Algorithm aversion denotes a dysfunctional tendency to prefer human over algorithmic advice even when the latter is more accurate. Importantly, algorithm aversion is contingent on the decision-maker being able to see it perform prior to the decision-task. Observing that an algorithm makes errors on occasion is assumed to violate decision-makers' exaggerated expectations about algorithmic accuracy, leading them to lose trust in the algorithm. Surprisingly, However, in the most common research paradigm researchers use to study the informational social influence of advice (the judge-advisor system), evidence for algorithm aversion is scarce. Most judge-advisor studies report either the opposite phenomenon of algorithm appreciation (identical advice is preferred when it is allegedly stems from an algorithm) or find no differences between algorithmic and human advice. In the few judge-advisor studies that report algorithm aversion, methodological problems preclude firm conclusions about its occurrence. One possible reason for the lack of evidence of algorithm aversion in the judge-advisor system is that few studies provide decision-makers with the information necessary to infer that the algorithm – while good – is not perfect. In a preregistered study creating optimal conditions for algorithm aversion to emerge, we instead observed algorithm appreciation, and adding a human-in-the loop did not increase reliance on algorithmic advice. This poses questions about the generalisability of the algorithm aversion effect.

**Keywords:** advice taking, algorithm aversion, algorithm appreciation, judgement and decision-making, social influence

**Presentation type:** Original Research Talk

**Session:** Numerical assimilation in anchoring, advice taking, and hindsight bias

---



## Why Do We Follow Multiple Advisors' Advice More Than One Advisor's? – The Role of Precision

Julia Luisa Bengelsdorf <sup>\*</sup>, Christian Treffenstädt, Stefan Schulz-Hardt

*University of Göttingen*

The present study entails a conceptual replication and further investigation of the finding that judges in a judge-advisor system follow aggregated advice from multiple advisors more than a single piece of advice. Specifically, we compare the influence of a single piece of advice to the influence of aggregated advice from three advisors over a series of numerical judgment tasks. In addition, we introduce numerical precision as a potentially important determinant of advice taking when receiving advice from multiple advisors.

**Keywords:** advice taking, multiple advisors, judge-advisor

**Presentation type:** Original Research Talk

**Session:** Numerical assimilation in anchoring, advice taking, and hindsight bias

---

## Assimilation to External Cues: Comparing the Reliability of Anchoring, Advice Taking, and Hindsight Bias

Tobias R. Rebholz <sup>1\*</sup>, Lukas Röseler <sup>2</sup>, Julia Groß <sup>3</sup>

<sup>1</sup> *University of Tübingen*, <sup>2</sup> *Münster Center for Open Science, University of Münster*, <sup>3</sup> *University of Mannheim*

People's estimates of quantities—such as the height of a tower or the distance between two cities—can be influenced by external values, including random numbers in the environment or estimates from another person. We reviewed three related phenomena in quantitative estimation: anchoring, advice taking, and hindsight bias. These effects are assimilative (i.e., estimates are drawn towards the external value) and exhibit robust and medium to large effect sizes. Here, we introduce a unified framework for investigating the three phenomena and show that, despite their similarities, the reliability of measuring the three effects in terms of participants' susceptibility to or reliance on the respective external values differs considerably. In Study 1, we used open data from three published experiments (total N = 344). Our findings indicate no reliability for anchoring effects, high reliability

for advice taking, and moderate reliability for hindsight bias. Although the data sets differed in experimental settings, informativeness of the external value, computation of assimilation scores, and knowledge domains, these differences could not fully account for the differences in reliability. In Study 2, we therefore plan to examine the reliability of these phenomena within a homogenized experimental paradigm.

**Keywords:** anchoring, advice taking, hindsight bias, reliability, assimilation, judgment and decision-making

**Presentation type:** Original Research Talk

**Session:** Numerical assimilation in anchoring, advice taking, and hindsight bias

---

## Navigating Anchor Relevance Skillfully: Expertise Reduces Susceptibility to Anchoring Effects

Maren Mayer <sup>1\*</sup>, Tobias R. Rebholz <sup>2</sup>

<sup>1</sup> *Leibniz-Institut für Wissensmedien, Tübingen*, <sup>2</sup> *Eberhard Karls Universität, Tübingen*

Although expertise strongly influences the accuracy of judgments, its role in anchoring is still unclear with findings of reduced, similar, and stronger anchoring in experts compared to novices. Similarly, the three most prominent theories of anchoring – the Insufficient Adjustment Model, the Selective Accessibility Model, and the Scale Distortion Theory – also make different predictions regarding the influence of expertise on anchoring. To address this inconsistency in both empirical results and theoretical accounts, we manipulate individuals' expertise prior to a perceptual estimation task. Based on the literature on numerical judgments and wisdom of crowds, we expect participants trained to become experts are less influenced by anchors than untrained participants. Additionally, we manipulate anchor relevance and anchor extremity for which all three theories make similar prediction. Here, we expect stronger anchoring effects for extreme compared to moderate anchors and relevant compared to irrelevant anchors. In two preregistered experiments (total N = 567), we find that experts do indeed show less anchoring compared to novices, and that more extreme anchors lead to stronger anchoring effects. However, the effect of anchor relevance is inconclusive in both experiments. In a third upcoming study, we will manipulate participants' expertise before a cued judgment task. Again, we expect that anchoring is reduced for experts, irrelevant anchors, and moderate anchors. Our results demonstrate that expertise has considerable

effects on anchoring. Therefore, theories of anchoring should take expertise into account as a strong inhibitor of anchoring effects.

**Keywords:** relevance, accuracy, heuristics, adjustment, numerical judgments, dependent judgments

**Presentation type:** Original Research Talk

**Session:** Numerical assimilation in anchoring, advice taking, and hindsight bias

---

## **Metacognitive myopia in a novel paradigm combining advice taking and implicit directed forgetting**

Florian Scholten <sup>1\*</sup>, Klaus Fiedler <sup>2</sup>, Mandy Hütter <sup>1</sup>

<sup>1</sup> *University of Tübingen*, <sup>2</sup> *Heidelberg University*

According to metacognitive myopia (MM), decision makers are highly sensitive to complex samples, but inadequate monitoring and control prevent them from critically evaluating sampled stimuli. In a novel paradigm combining advice taking and implicitly directed forgetting, we investigated the role of memory in assessing the validity of advice. Participants (N<sub>total</sub> = 159), who were asked to estimate the cost of building a house on the basis of (in)valid price quotations from two construction firms, attempted to process and later correct invalid information rather than ignore it in their final judgements. Strikingly, MM biases in memory and judgement showed no coherence. In other words, participants displayed a preference for recalling and correcting invalid advice rather than forgetting it. The maladaptive consequences of this process are discussed.

**Keywords:** Metacognition, Advice taking, Directed Forgetting, Adaptiveness

**Presentation type:** Original Research Talk

**Session:** Numerical assimilation in anchoring, advice taking, and hindsight bias

# LARGE LANGUAGE MODELS IN PSYCHOLOGICAL RESEARCH

---

## The Anatomy of Risky Choice: Uncovering Subjective Reasons with Large Language Models

Kamil Fuławka <sup>1, 2\*</sup>, Ralph Hertwig <sup>2</sup>, Dirk Wulff <sup>2, 3</sup>

<sup>1</sup> *Dresden University of Technology*, <sup>2</sup> *Max Planck Institute for Human Development*, <sup>3</sup> *University of Basel*

We present a novel approach to understanding the subjective reasons underlying risky decision-making, enabled by large language models (LLM). Traditional models of risky choice often assume that decision-making relies on a single, stable reason or process, regardless of context. This simplification overlooks the variability in reasoning that may occur depending on the situation. To address these limitations, we developed an LLM-based approach that utilizes free-text reports to reveal the subjective reasons behind decisions, and we implemented a proof-of-concept in three stages. First, we extracted a comprehensive set of nearly 50 decision reasons from formal models, heuristics, and basic motivations. Second, we collected free-text retrospective verbal reports from 86 participants after each of 20 risky choices they made. Third, we employed advanced prompt engineering techniques with a state-of-the-art LLM to identify the reasons mentioned in these reports. Our results provide strong evidence that decision reasons vary systematically across different choice problems but less across individuals. Furthermore, a simple predictive model based on the identified reasons achieves an out-of-sample accuracy of about 92%, validating the approach. Our results suggest that combining verbal reports and an LLM-based analysis with a large sample and comprehensive set of choice problems can uncover how people make risky decisions, including intricate relationships between decision reasons and types of choice problems.

**Keywords:** risky choice, large language models, verbal reports

**Presentation type:** Original Research Talk

**Session:** Large language models in psychological research

## Foundation models of human cognition

Marcel Binz \*

*Helmholtz Munich*

Most cognitive models are domain-specific, meaning that their scope is restricted to a single type of problem. The human mind, on the other hand, does not work like this – it is a unified system whose processes are deeply intertwined. In this talk, I will present our ongoing work on foundation models of human cognition: models that cannot only simulate, predict, and explain behavior in a single domain but instead offer a truly universal take on our mind. Together with a large international consortium, we have transcribed data from over 170 experiments – covering all major areas of cognitive psychology, including reinforcement learning, memory, decision-making, probabilistic reasoning, and many more – into a text-based form. We then used this data set to finetune a large language model, thereby aligning it to human behavior. The resulting model provides a window into human cognition and can be used for rapid prototyping of behavioral studies, to improve traditional cognitive models, and to generate new hypotheses about human information processing.

**Keywords:** cognitive science

**Presentation type:** Original Research Talk

**Session:** Large language models in psychological research

---

## Examining participant diversity in psychological research

Anna Thoma <sup>1\*</sup>, Rui Mata <sup>2</sup>, Ralph Hertwig <sup>1</sup>, Dirk Wulff <sup>1, 2</sup>

<sup>1</sup> Max Planck Institute for Human Development, <sup>2</sup> Universität Basel

Who are the people who have been studied in psychological research for more than 120 years? Previous attempts at characterizing the demographic diversity of participants were limited to selected factors (e.g., region or gender), research subfields, or specific timespans. Despite its relevance for the generalizability of empirical findings, psychological research is yet missing an encompassing account of participant diversity and its evolution. Using natural language processing, we analyze more than 230.000 full texts of articles published in psychological journals between 1894 and 2022. Specifically, we use state-of-the-art large language models to investigate the

reported composition of participant samples considering age, gender, ethnicity, language, region, education, and socioeconomic status. To evaluate our methodological approach, we compare the extracted information between the language model and human coders in a subset of articles. Our findings help to develop a better understanding of the empirical history of psychological research, highlight the relationship between diversity and scientific reporting conventions, and provide new insights into the validity of using large language models to extract content from scientific articles.

**Keywords:** diversity, LLM, psychological research

**Presentation type:** Original Research Talk

**Session:** Large language models in psychological research

---

## Evaluating language model alignment with free associations

Dirk Wulff <sup>1, 2\*</sup>, Zak Hussain <sup>2, 1</sup>, Samuel Aeschbach <sup>1, 2</sup>, Rui Mata <sup>2</sup>

<sup>1</sup> Max Planck Institute for Human Development, <sup>2</sup> University of Basel

The alignment between large language models and humans' knowledge and preferences is central to the safe and fair deployment of such tools. A number of approaches to quantifying alignment exist, but current work is fragmented, preventing an overview across categories of stimuli and demographic groups. We propose that free associations from massive citizen-science projects can advance representational alignment by helping evaluate both content and demographic inclusivity. We assess the representational alignment of multiple closed (e.g., GPT-4) and open models (e.g., Llama-3.1) and data from the English Small World of Words Study (ca. 80.000 respondents, 3.7 million responses). Our results indicate that while the language model can capture some procedural signatures of human responses, it shows heterogeneous alignment across stimuli categories, poor representational alignment for controversial topics (e.g., religion, nationality), and differential representation of demographic groups (e.g., males, females). All in all, our work suggests that free association can be used to evaluate the representational alignment of large language models.

**Keywords:** large language models, semantic representations, free associations, individual differences

**Presentation type:** Original Research Talk

**Session:** Large language models in psychological research

## Human vs. LLM-Generated Possibilities Shape Moral Judgments

Lara Kirfel <sup>1\*</sup>, Neele Engelmann <sup>2</sup>, Anne-Marie Nussberger <sup>3</sup>

<sup>1</sup> Center for Humans and Machines, Max Planck Institute for Human Development, <sup>2</sup> Center for Humans and Machines, Max Planck Institute for Human Development, <sup>3</sup> Center for Humans and Machines, Max Planck Institute for Human Development

Moral judgment often depends on evaluating the range of possible actions available to an agent in a given situation. Determining blame requires considering what an agent could have done differently. While people often rely on a limited set of default options when thinking about what's possible in a given context (Morris et al., 2021; Zhang et al., 2021; Bear, Bensinger, Jara-Ettinger, Knobe, & Cushman, 2020), Large Language Models (LLMs) generate broader and qualitatively distinct sets of alternatives by leveraging extensive datasets (Poulsen & Dedeo, 2023). In this study, we demonstrate that people attribute more blame to an agent when they first consider action options generated by an LLM, compared to when they generate the options themselves. This shift in blame attribution is driven by the qualitative difference in the consideration sets produced by humans versus LLMs. We situate these findings within theories of human modal cognition, highlighting how differences in the representation of possibilities influence moral evaluation. Finally, we discuss the implications of these results for Human-LLM interaction.

**Keywords:** moral judgment, modal reasoning, reasoning, Human-LLM-Interaction

**Presentation type:** Original Research Talk

**Session:** Large language models in psychological research

## NEGATION IN LANGUAGE AND BEYOND

---

### **Ironic Effects of Negation in More Naturalistic Tasks**

Parker Smith \*, Carolin Dudschig , Barbara Kaup

*University of Tuebingen*

Negation is often used to indicate what a person ought not do. However, at times the use of negation can cause the opposite effect to occur. This phenomenon, termed ironic negation, has been researched primarily regarding mental suppression, such as when avoiding thinking about a subject (famously, a pink elephant) or regulating one's behaviors (such as during dieting). To investigate the mechanisms regarding ironic effects of negation, and at what level of complexity these effects arise/disappear, we have been developing a series of experiments with a variety of experimental tasks. In the first series, participants responded to affirmative and negative spatial instructions ("now/not left/right") and pressed the according left or right key. Ironic effects were clearly observable in this simple response time task. In a follow-up study we are currently focusing on how negation in instructions affects more naturalistic tasks. Specifically, in this study a ball moves upward over a computer screen at a constant rate and is moved left and right by participants. The participant must keep the dot along a marked black path as best as they can. Across trials, we manipulate path complexity and movement speed. Importantly, the instructions given to the participant are either phrased in a negated or affirmative manner. These instructions emphasized that if errors occur, they should happen on a specific side of the path. If ironic negation occurs in this more naturalistic task, we anticipate that errors defying the instructions will be made more frequently than errors on the opposing side.

**Keywords:** Ironic negation effects, Linguistic negation, Mouse Tracking

**Presentation type:** Original Research Talk

**Session:** Negation in language and beyond

---



## Activation of plausible alternatives in negation processing

Daria Tack <sup>1\*</sup>, Chiara Boila <sup>1</sup>, Barbara Kaup <sup>2</sup>, Yvonne Portele <sup>1,3</sup>, Anne Rösch <sup>1</sup>, Angela Grimm <sup>1</sup>

<sup>1</sup> Goethe University Frankfurt, <sup>2</sup> University of Tübingen, <sup>3</sup> Free University Berlin

**Background & Rationale.** The processing of statements with constituent negation, where negative particles act as focus markers, suggests the activation of plausible alternatives, as shown by Capuano et al. (2021). This talk presents the results of a pilot study (Study1) that replicated Capuano's method for German and identified polarity effects, and of a follow-up study (Study2) that aimed to disentangle the semanticpragmatic information encoded in the connectors and polarity encoded by the negator.

**Method.** While Study1 involved two conditions: negative-BUT and affirmative-AND ("Ich sehe keine Tasche, aber ich sehe ..." vs. "Ich sehe eine Tasche und ich sehe ..."), Study2 introduced an additional condition – negative-AND ("Ich sehe keine Tasche und ich sehe ..."). In both studies, native German speakers (N in PS: 108), with a mean age of 31 years (range: 19-72), completed sentences with a word they believed best suited the given context. Responses were analyzed by examining the proportion of co-hyponyms (i.e., plausible alternatives) relative to other semantic categories, and by assessing the semantic similarity between stimulus nouns and participants' responses using scores from the de wiki semantic space.

**Results & further expectations.** Study1 revealed significant polarity effects ( $p < 0.001$ ), with participants more frequently selecting co-hyponyms in the negative condition compared to other semantic categories. Study2 is expected to explore the potential influence of the connectors "but" and "and" on this effect.

**References.** Capuano, F., Dudschig, C., Günther, F., & Kaup, B. (2021). Semantic similarity of alternatives fostered by conversational negation. *Cognitive Science*, 45(7).

**Keywords:** negation processing, plausible alternatives

**Presentation type:** Original Research Talk

**Session:** Negation in language and beyond

## Redundant Gestures: Integrating Head Nods, Shakes, Thumbs Gestures and Speech

Samuel Sonntag <sup>1\*</sup>, Ian Mackenzie <sup>1</sup>, Emanuel Schütt <sup>1</sup>, Merle Weicker <sup>2</sup>, Sara Oguz <sup>2</sup>, Carolin Dudschig <sup>1</sup>

<sup>1</sup> *Eberhard-Karls-Universität Tübingen*, <sup>2</sup> *Goethe-Universität Frankfurt*

We communicate not only through words but also in a rich, multimodal way, combining verbal and non-verbal signals. This holds for language in general, but is particularly interesting for negation for several reasons. For example, there is a wide variety of non-verbal signals to transfer negation. These non-verbal negation markers can be face- (e.g., the not face), head- (e.g., head shake) or hand related (e.g., thumbs down). Given the rich multimodal nature of negation, it makes it an ideal testing ground to investigate how the brain integrates simultaneous information from multiple sensory inputs. Using experimental paradigms adapted from basic conflict tasks in cognitive psychology - we investigated the integration of verbal and non-verbal negation markers. Earlier studies showed that standard conflict effects are present in the processing domain: Response times are faster if the verbal and non-verbal information matches (e.g. “no” combined with a “thumbs down” gesture) than when they mismatch (e.g., “no” combined with a “thumbs up” gesture). Interestingly, this effect was stronger for head-related gestures (e.g., head shake) than for hand related gestures (e.g., thumbs down). Also, these compatibility effects were stronger for affirmative than negated combinations. In several follow-up studies, we now analyze the origin of these compatibility effects via the addition of uni-modal conditions that allowed us to investigate facilitation versus inhibitory sources of these effects. The results of these studies will be discussed.

**Keywords:** Negation, gesture, non-verbal communication, conflict processing

**Presentation type:** Original Research Talk

**Session:** Negation in language and beyond

## Negation, Pragmatics, and Prediction: Evidence from Eye-Tracking

Isabel Orenes \*, Andrea Speranza , Laura Cepero

*Universidad Nacional de Educación a Distancia*

The process of understanding has been widely shown to be more complex when sentences are presented in a negative form, such as “A robin is not a tree,” compared to their affirmative counterparts, regardless of context. Two eye-tracking experiments compared affirmative and negative sentences in both an informative context, “Due to its high addiction, heroin is not very safe,” and an uninformative one, “The heart’s functioning is not very superficial.” In Experiment 1, participants read sentences while their eye movements were tracked. The results showed that eye fixations on the target word (e.g., “safe”) lasted longer for negative sentences than for affirmative ones in the uninformative context, but only for true sentences. This difference disappeared in the informative context, supporting the theory that context facilitates the processing of negation. We also tested whether this finding was due to predictability. In Experiment 2, we equalized predictability across both contexts. Participants listened to the sentences while two target words were displayed on the screen (e.g., “Safe/Dangerous” or “Superficial/Important”), and their eye movements were tracked. We will discuss those results in relation to the main theories of comprehension.

**Keywords:** Language comprehension, Negation, Pragmatics, Prediction, Eye-Tracking

**Presentation type:** Original Research Talk

**Session:** Negation in language and beyond

---

## Negation induced forgetting beyond semantic associative interference

David Beltrán \*

*Universidad Nacional de Educación a Distancia (UNED)*

Negation has historically been associated with paradoxical effects on memory, particularly through the induction of false memories. Recent research, however, has shown that negation can also lead to forgetting. Specifically, responding NO, in contrast to responding YES, has been found to impair memory in subsequent recognition and free recall tasks (Mayo et al., 2014). Despite this emerging

evidence, the mechanisms driving negation-induced forgetting remain unclear. One plausible explanation is that it may result from associative interference, akin to the fan effect (Radvansky et al., 2017). This interference likely arises because negation imposes greater semantic complexity than affirmation, as it requires the mental representation of both the negated scenario and its alternative. For example, in one study, after learning from a video that an ashtray was empty, participants responded NO to statements like “The ashtray was full” and YES to statements like “The ashtray was empty”. As a result, the word “ashtray” was less likely to be remembered after NO than YES responses, likely because the former involved an additional scenario for the same object. This communication will present our most recent findings using two novel memory paradigms designed to match the semantic complexity of YES and NO responses. The findings demonstrate that, although associative interference may have played a role in previous studies, negation—whether as a response or as a lexical element in a statement—consistently leads to greater forgetting than affirmation. Based on these results, we will also explore potential mechanisms underlying the long-term effect of negation on memory.

**Keywords:** Negation, Forgetting, Interference, Inhibition

**Presentation type:** Original Research Talk

**Session:** Negation in language and beyond

## COGNITIVE PROCESSES IN DECISIONS FROM EXPERIENCE

---

### **Being Risk Averse and Risk Seeking at the Same Time: An Apparent Preference Reversal in Valuations and Decisions from Experience**

Sebastian Olschewski <sup>1, 2\*</sup>, Benjamin Scheibehenne <sup>3</sup>, Konstantinos Tsetsos <sup>4</sup>

<sup>1</sup> University of Basel, <sup>2</sup> Warwick Business School, <sup>3</sup> Karlsruhe Institute of Technology, <sup>4</sup> University of Bristol

Human risk preferences are less stable than what economic theories anticipate. Here, drawing from psychological theories of information representation and integration, we predicted and found a novel signature of apparent risk preference reversal in decisions made after experiencing reward information serially: Participants (n = 190, online convenience sample) undervalue high-variance

options relative to low-variance ones in independent valuations, consistent with risk aversion; but choose high-variance options more frequently in binary choices, consistent with risk seeking. With three additional experiments we demonstrate that this behavioral gap can be closed but cannot be reversed through manipulating the presentation format (sequential or simultaneous information presentation) and the task demand (absolute or relative judgments). Additionally, aligning presentation format and task demand increases the stability of individual risk preferences across valuation and choice. We conclude that, besides individual differences in risk preferences, taking risks critically depends on cognitive processes of numerosity representation and information integration.

**Keywords:** preference reversal, decisions from experience, risk taking, selective integration, value learning, risk preference, risk aversion

**Presentation type:** Original Research Talk

**Session:** Cognitive processes in decisions from experience

---

## Feedback-induced attitudinal changes in risk preferences

Stefano Palminteri \*

*Ecole normale supérieure, Paris, Institut national de la santé médicale*

According to the normative standpoint, decision-making under risk, as it is traditionally instantiated in choice among fully described probabilistic lotteries, should not be affected by the disclosure of outcomes (feedback). Yet, contrary to this normative prescription, empirical studies have repeatedly reported that risk preferences are affected by immediate presentation of choice outcomes. The consensual and intuitive hypothesis is that repeated feedback affects risk preferences via a learning process, whereby experienced outcomes alter the representation of subjective values. However, despite a large agreement concerning its psychological mechanisms, available evidence does not allow to robustly establish the direction the impact of feedback on key behavioral outputs, namely, risk propensity and maximization. Here, we ran a series of seven experiments, tailored to decipher the effects of feedback on risk preferences and found that the presence of feedback consistently increases risk-taking, without any detectable impact on expected value maximization. Crucially, the temporal dynamics of the effect of feedback and trial-by-trial analysis on outcome sensitivity directly falsified the learning hypothesis in general, and more specifically one of the currently most

influential model of the role of experience in decisions under risk. These results challenge the learning account in favor of an attitudinal effect, induced by the anticipation of feedback information. Epistemic curiosity and regret avoidance may drive this effect in partial and complete feedback conditions, respectively.

**Keywords:** decision, risk, feedback, modelling

**Presentation type:** Original Research Talk

**Session:** Cognitive processes in decisions from experience

---

## Predecisional information search adaptively reduces three types of uncertainty

Mikhail Spektor <sup>1, 2\*</sup>, Dirk Wulff <sup>3, 4</sup>

<sup>1</sup> *VinUniversity*, <sup>2</sup> *University of Warwick*, <sup>3</sup> *Max Planck Institute for Human Development*, <sup>4</sup> *University of Basel*

How do people search for information when they are given the opportunity to freely explore their options? Previous research has suggested that people focus on reducing uncertainty before making a decision, but it remains unclear how exactly they do so and whether they do so consistently. We present an analysis of over 1,000,000 information-search decisions made by over 2,500 individuals in a decisions-from-experience setting that cleanly separates information search from choice. Using a data-driven approach supported by a formal measurement framework, we examine how people allocate samples to options and how they decide to terminate search. Three major insights emerge. First, pre-decisional information search has at least three drivers that can be interpreted as reducing three types of uncertainty: structural, estimation, and computational. Second, the selection of these drivers of information search is adaptive, sequential, and guided by environmental knowledge that integrates prior expectations, task instructions, and personal experiences. Third, pre-decisional information search exhibits substantial inter-individual heterogeneity, with individuals recruiting different drivers of information search. Together, these insights suggest that human information search is complex in ways that cannot be fully explained by monolithic accounts of information search, including proposals focused on estimation uncertainty or cost-benefit analysis. We conclude that broader theories of human information-search behavior are necessary.

**Keywords:**

**Presentation type:** Original Research Talk

**Session:** Cognitive processes in decisions from experience

---

## **Is there a description-experience gap in loss aversion? A meta-analysis with cumulative prospect theory.**

Nuno Busch <sup>1\*</sup>, Thorsten Pachur <sup>1, 2</sup>

<sup>1</sup> *School of Management, Technische Universität München*, <sup>2</sup> *Center for Adaptive Rationality, Max Planck Institute for Human Development*

Loss aversion is one of the most prominent concepts in the study of risky decision making. Traditionally, research on loss aversion has utilized paradigms in which participants choose between risky options whose payoff distributions are given as summary descriptions (decisions from description). But to what extent does loss aversion also emerge in situations in which the payoff distributions are learned from experiential sampling—that is, in decisions from experience? To address this question, we conducted a meta-analysis, re-analyzing and synthesizing all existing datasets (total  $n > 430$  per condition) that allow for a direct comparison of decisions from description and decisions from experience based on mixed gambles (i.e., where the options can lead to either a gain or a loss). Analyzing the choices with cumulative prospect theory in a Bayesian framework suggests a higher level of loss aversion in decisions from experience than in decisions from description. Possible mechanisms leading to this novel description-experience gap, such as asymmetric reinforcement learning during the sampling phase, are discussed.

**Keywords:** risky choice, decision making, description-experience gap, loss aversion, cumulative prospect theory, decisions from description, decisions from experience

**Presentation type:** Original Research Talk

**Session:** Cognitive processes in decisions from experience

---

## Negative Recency in Experience-Based Risky Choice and the Description-Experience Gap

René Schlegelmilch <sup>1\*</sup>, Andy Wills <sup>2</sup>, Bettina von Helversen <sup>1</sup>

<sup>1</sup> *University of Bremen*, <sup>2</sup> *University of Plymouth*

Learning how to make decisions from experience is often studied using probabilistic choice tasks, as in reward learning or risky gambles (e.g., option A gives a reward with a probability of 75%, option B with 25%, to-be-learned in repeated trial-and-feedback trials). An observed phenomenon in such tasks is negative or wavy recency. This entails that learners expect that the likelihood of encountering a rare event (reward for option B) increases with the number of consecutively observed common events (reward for option A). In classical conditioning, it has been speculated that negative recency is moderated by the magnitude of the reward associated with the rare event. To test this hypothesis in the context of decisions from experience, we meta-analytically re-analyzed 90 studies on lottery decisions (risky gambles: safe vs. risky option). In these, participants received descriptions of the options' payoffs and probabilities (e.g., safe option: 15 points vs. risky option: [25% 50 points or 75% 5 points]). In the first trials, they made decisions only based on the descriptions (DE) without receiving feedback. Subsequently, they received full feedback (FF), i.e., gained experience. In DE trials, participants seemed to overweight rare events in their decisions, which was moderated by whether the risky option was associated with a rare loss (increased safe choice) compared to a rare win. Crucially, this effect completely vanished in FF trials (i.e., DE-FF-gap). In FF trials, negative recency was strongly evident and moderated by reward magnitude. This speaks for feedback-based experience altering cognitive processing, possibly mitigating risk preferences.

**Keywords:** risky gambles, probability learning, conditioning, reward magnitude, negative recency, description-experience gap

**Presentation type:** Original Research Talk

**Session:** Cognitive processes in decisions from experience



## CHALLENGES AND NEW AVENUES IN THE RESEARCH ON IMITATIVE BEHAVIOR

---

### **Mimickees are perceived as more competent and receive higher donations than mimickers**

Pawel Muniak <sup>1\*</sup>, Oliver Genschow <sup>2</sup>, Hans Alves <sup>3</sup>, Wojciech Kulesza <sup>1</sup>

<sup>1</sup> *SWPS University, Faculty of Psychology in Warsaw, Poland*, <sup>2</sup> *Leuphana University Lüneburg, Institute of Management and Organization, Germany*, <sup>3</sup> *Ruhr University Bochum, Department of Psychology, Germany*

Previous research showed that being mimicked leads people to act prosocial towards the mimicker, because mimickers are perceived as warm. However, most studies have focused primarily on interactions among dyads, ignoring the role of third-party observers. To address this gap, we conducted six preregistered experiments (total N = 1,629) in which we tested how third-party observers perceive individuals who are mimicked (i.e., mimickees) and individuals who mimic others (i.e., mimickers) using the Big Two framework. Results show that mimickees are perceived as more competent (but not warm), which leads mimickees (but not mimickers) to receive more donations. This effect is particularly pronounced when mimickers respond with the exact same movements, rather than when they respond with different movements. This indicates that it is not merely responding to others, but the actual imitation of movements that increases perceived agency and as a consequence donations. The results challenge the generalizability of previous theories on the effects of being mimicked.

**Keywords:** mimicry, person perception, donation, Big Two

**Presentation type:** Original Research Talk

**Session:** Challenges and new avenues in the research on imitative behavior

## **A cognitive spin on the headwind-tailwind hypothesis: Unawareness of facilitation effects on the imitation-inhibition task**

Danna Oomen <sup>1\*</sup>, Adam Hanh <sup>2</sup>, Oliver Genschow <sup>1</sup>

<sup>1</sup> *Leuphana University, Germany*, <sup>2</sup> *University of Bath, UK*

Life presents us with both challenges (headwinds) and blessings (tailwinds). Previous studies show that people have a headwind bias; that is, we tend to be more aware of the challenges we must overcome than the benefits we enjoy. This bias could, at least partly, be explained by motivational factors: recognizing headwinds can provide an excuse for failure while amplifying our achievements. But what happens when there are no motivational influences? In a pre-registered study (N = 191), we tested the hypothesis that people have stronger awareness of interference (incongruent trials) than facilitation (congruent trials) using the imitation-inhibition task, a simple cognitive reaction time task. After completion, they rated how fast they thought they had responded on the three different trial types (congruent, neutral, incongruent). Consistent with the typical finding of the imitation-inhibition task, we found faster responses for congruent trials than neutral trials, and faster responses for neutral trials than for incongruent trials. However, in line with our hypothesis, we found participants to be more aware of the interference caused by incongruent trials than facilitation offered by congruent trials. In a second pre-registered experiment, we tested the hypothesis that people can accurately predict their performance on the different trial types by administering the awareness questions before the task. This time, participants' (N = 191) predictions were in line with their actual task performance. Taken together, these studies suggest that while people can rationally predict their cognitive performance, their awareness shifts after task completion, leading to an underappreciation of tailwinds.

**Keywords:** headwind-tailwind hypothesis, imitation-inhibition, awareness, facilitation, interference

**Presentation type:** Original Research Talk

**Session:** Challenges and new avenues in the research on imitative behavior

## Cultural differences in automatic imitation

Oliver Genschow <sup>1\*</sup>, Mareike Westfal <sup>1</sup>, Angela Dorrough <sup>2</sup>, Emiel Cracco <sup>3</sup>, Tobias Wingen <sup>2</sup>, Jan Crusius <sup>4</sup>

<sup>1</sup> *1 Leuphana University Lüneburg*, <sup>2</sup> *2 FernUniversität in Hagen*, <sup>3</sup> *3 Ghent University*, <sup>4</sup> *4 University of Greifswald*

People have the automatic tendency to imitate one another, but it remains unclear whether and how this ubiquitous nonverbal behavior varies across cultures. To explore cultural differences in automatic imitation, we conducted two preregistered experiments using the imitation-inhibition task, in different countries that vary in terms of collectivism/individualism. In Experiment 1 (N = 408), we examined participants from Vietnam and the USA but found no significant differences in automatic imitation between these countries. As we assessed imitation in two countries only, Experiment 1 remains unclear whether the detected effects are specific for the USA and Vietnam, or whether they can be generalized across more nations differing in terms of collectivism/individualism. Moreover, as the classical imitation-inhibition task confounds imitative with spatial compatibility, any potential difference in terms of imitative compatibility between cultures could have been hidden. To address these shortcomings, Experiment 2 involved a larger sample (N = 4,447) from 22 countries and controlled for spatial compatibility. The results showed no overall difference between individualistic and collectivistic nations in the extent of imitation, but revealed small qualitative differences in how people imitate. Individuals from collectivistic, as compared to individualistic cultures, imitated more strongly when spatial information was controlled. These findings suggest that while imitation in collectivistic nations is more resistant to conflicting non-social cues, imitation in individualistic cultures more strongly depends on external, non-social factors.

**Keywords:** imitation, culture, individualism, collectivism

**Presentation type:** Original Research Talk

**Session:** Challenges and new avenues in the research on imitative behavior

## **The role of expectations for observationally acquired stimulus-response binding and retrieval effects in human-AI interactions**

Kira Franke <sup>1\*</sup>, Carina Giesen <sup>2</sup>

<sup>1</sup> *Friedrich-Schiller-Universität Jena*, <sup>2</sup> *Health and Medical University Erfurt*

Giesen and Rothermund (2022) found that observationally acquired stimulus-response binding and retrieval (oSRBR) effects only occurred if participants believed to be interacting with another human, while effects were absent when they believed that they were interacting with a computer. However, in further unpublished studies from our lab, this finding could not be replicated consistently, suggesting that there might be other factors that influence whether people rely on observed actions performed by AIs/computers to guide their own actions. In two experiments, we investigated whether the expectation to be interacting with another human vs. an AI modulated oSRBR effects. To manipulate expectations, at the start of the experiment, participants were either told that they were going to interact with another human or with an AI. However, after a brief connection attempt, participants in the human condition were told that there were no other participants available, and that they would therefore do the experiment with an AI. Then they performed an online interactive color classification task to assess oSRBR effects. We expected to only find oSRBR effects if participants expected to interact with an AI from the start, but not if their initial expectation to be connected to another human was frustrated. Contrary to our expectations, we did not find a modulation of oSRBR effects by expectations in experiment 1. However, due to a significant number of drop-outs in the condition, in which a human partner was expected, we are currently replicating the study. Results will be presented and discussed.

**Keywords:** Stimulus-response binding, observational learning, artificial intelligence

**Presentation type:** Original Research Talk

**Session:** Challenges and new avenues in the research on imitative behavior

## Does being tech-savvy modulate differences in automatic imitation of robots versus humans?

Clara de Paula Couto <sup>1</sup>, Carina Giesen <sup>2\*</sup>

<sup>1</sup> *Friedrich-Schiller University Jena*, <sup>2</sup> *HMU Health and Medical University Erfurt*

Research on imitative action control indicate that participants have a strong preference to co-represent or imitate actions of their interaction partners - at least as long as these partners are (believed to be) biological agents or humans. For instance, observing a movement that is compatible (incompatible) with the to-be-performed action typically produces facilitation (interference) effects (Brass et al., 2001). These effects are modulated by animacy, meaning that the effects are stronger when observed movements stem from other humans, but are reduced or absent when observed movements stem from computers, robots, or nonbiological objects. Tentatively, this indicates that people have a certain reluctance to automatically imitate, co-represent, or utilize observed actions if these stem from nonhuman interaction partners. The present study explores whether this animacy effect is modulated by interindividual differences regarding attitudes towards (new) technologies. Accounts of technology acceptance would predict that tech-savvy individuals should be more willing to imitate robots (which implies reduced animacy effects). In turn, theories of anthropomorphization (Epley et al., 2007) would predict the opposite, as tech-savvy individuals have more elaborated knowledge about robots and thus should be less prone to attribute human-like features to robots, resulting in reduced imitation (which implies stronger animacy effects). I will present first data on this issue by studying automatic imitation effects for robots versus humans (manipulated within subjects) and measuring explicit attitudes towards robots and technological advances.

**Keywords:** co-representation, robots, humans, attitudes towards technological advances

**Presentation type:** Original Research Talk

**Session:** Challenges and new avenues in the research on imitative behavior

## EXPERIMENTAL AESTHETICS: DIFFERENT FIELDS

---

### Art for art's sake? The influence of art framing and context on the acceptance of immoral behaviour

Itay Goetz <sup>1, 2, 3\*</sup>, Lara Bernhardt <sup>1</sup>, Friederike Margareta Karg <sup>1</sup>, Alexander Pastukhov <sup>1, 2, 3</sup>, Claus-Christian Carbon <sup>1, 2, 3</sup>

<sup>1</sup> Department of General Psychology and Methodology, University of Bamberg, Bamberg, Bavaria, Germany., <sup>2</sup> Research Group EPÆG (Ergonomics, Psychological Aesthetics, Gestalt), Bamberg, Bavaria, Germany., <sup>3</sup> Bamberg Graduate School of Affective and Cognitive Sciences (BaGrACS), Bamberg, Bavaria, Germany

This study examines the impact of categorising visual representations of so-called “immoral acts” as either art or non-art on their subsequent evaluation and emotional response. Since the Renaissance, artists have employed their craft as a vehicle for challenging societal norms, utilising the medium of art to prompt the formation of new perspectives and to challenge the boundaries of traditional categorisation. In contrast to the processing of everyday objects, artworks are subject to a different set of cognitive processes, allowing for a more nuanced perception and the construction of deeper meanings. Overall, our study involved 140 participants who viewed the same set of 20 images under one of three experimental conditions[CCC1] [IG2] : an online setting that did not label any work as art, an online art gallery setting, and a physical art gallery setting. The results demonstrated that, while all conditions elicited negative emotional responses, the images were evaluated more favourably when labelled as art in an online art gallery setting, and even more so when viewed in a physical art gallery. Furthermore, images presented as art were less comprehensible and more surprising, indicating that viewers applied fewer conventional heuristics and categories in processing them. These findings suggest that art, particularly in traditional art settings, creates distinctive conditions that challenge and extend habitual thought patterns. By encouraging viewers to engage with extreme and novel ideas, art plays a pivotal role in transforming individuals, communities, and societies.

**Keywords:** Art; Aesthetic Appreciation; Moral; Ethics; Acceptance; Museum; Context; Societal Change; Framing

**Presentation type:** Original Research Talk

**Session:** Experimental aesthetics: Different fields

---

## Investigating the Role of AI-Generated Art in Shaping Moral and Aesthetic Judgments

Ionela Bara <sup>1\*</sup>, Richard Ramsey <sup>2</sup>, Emily Cross <sup>1</sup>

<sup>1</sup> *Social Brain Sciences Group, Department of Humanities, Social and Political Sciences, ETH Zurich, Zurich, Switzerland*, <sup>2</sup> *Neural Control of Movement Group, Department of Health Sciences and Technology, ETH Zurich, Zurich, Switzerland*

Historically, art creation has been regarded as a uniquely human means to express original ideas, emotions, and experiences. However, as Generative Artificial Intelligence continues to change our visual, aesthetic, legal, and economic culture, important questions are emerging regarding the moral and aesthetic consequences of AI-generated art. Despite the increasing prevalence of AI tools in art production, their moral implications remain poorly understood. Across two pre-registered experiments combining explicit and implicit paradigms with Bayesian modelling, we investigate whether information about the AI system impacts moral and aesthetic judgments and whether human art is implicitly associated with positive attributes, while AI-generated art is associated with negative attributes. Experiment 1 revealed that information about AI backend processes in art led to reduced moral acceptability regarding gaining financial incentives, prestige, art status, and aesthetic appeal. Experiment 2 demonstrated that human-made Impressionist Artworks were better recognised than their AI-generated counterparts. However, people did not reliably associate human-made art with positive attributes and AI-generated art with negative attributes in an implicit association task. These findings highlight that: (1) knowledge about AI systems shapes moral and aesthetic judgments, and (2) implicit associations between human-made art and AI-generated art and their perceived attributes are similar. This work deepens our understanding of people's moral and aesthetic perceptions of AI-generated art, which are essential for unravelling the complexities of human-AI art interactions and their societal impact.

**Keywords:** AI-generated art, moral judgments, aesthetic judgments, contextual information, implicit moral associations

**Presentation type:** Original Research Talk

**Session:** Experimental aesthetics: Different fields

---

## Waist-to-hip ratio and body attractiveness: Comparison of 2D and 3D body measurements

Emily Ufken \*, Ronald Hübner

*University of Konstanz*

Research on female body attractiveness, crucial to aesthetics, art, and health, examines features determining beauty and why they are appealing. Evolutionary theories link attractiveness to health and fertility, with the waist-to-hip ratio (WHR) as key indicator. However, using WHR as attractiveness measure is challenging, as it is based on three-dimensional (3D) information (body circumference), which is typically not readily available to the observer. To address this issue, studies on body attractiveness that commonly present two-dimensional (2D) stimuli (such as line drawings, photographs, or historical paintings) have simply used 2D versions of the WHR. However, these measures are viewpoint dependent, and it remains unclear how they relate to their 3D counterpart. In order to fill this gap, we investigated the relationship between 3D WHR and its 2D measures while also considering the influence of the body mass index (BMI). From photographs of 153 women with known 3D WHR and BMI, we digitally extracted the 2D WHR in frontal and profile view. Both 2D measures correlate positively with the corresponding 3D WHR, but the frontal 2D WHR underestimates and the profile 2D WHR overestimates the 3D WHR. Regression analysis shows that adding the BMI to a simple model with frontal 2D WHR significantly increases its predictive power up to  $R^2 = .527$ . However, it does not significantly increase by adding the 2D profile WHR. These results underscore the limitations that need to be taken into account when using different 2D body measurements for predicting body attractiveness.

**Keywords:** body attractiveness, waist-to-hip ratio, body mass index, body circumference, two-dimensional space

**Presentation type:** Original Research Talk

**Session:** Experimental aesthetics: Different fields



## Multisensory aesthetic perception: A quantitative-qualitative study on visuo-tactile interactions with material textures

Marella Campagna <sup>1, 2, 3\*</sup>, Alexander (Sasha) Pastukhov <sup>1, 2, 3</sup>, Claus-Christian Carbon <sup>1, 2, 3</sup>

<sup>1</sup> Department of General Psychology and Methodology, University of Bamberg, Bamberg, Bavaria, Germany, <sup>2</sup> Research Group EPÆG (Ergonomics, Psychological Aesthetics, Gestalt), Bamberg, Bavaria, Germany, <sup>3</sup> Bamberg Graduate School of Affective and Cognitive Sciences (BaGrACS), Bamberg, Bavaria, Germany

Material textures in everyday interactions evoke a rich sensory interplay, primarily between vision and touch. Despite growing research exploring material perception and the interaction between visual, haptic systems, a comprehensive understanding of the bottom-up and top-down processes in visuo-tactile aesthetics remains elusive. This study aims to unravel these sensory interactions through a multi-methodological lens, examining the cognitive and affective dimensions of visuo-tactile texture perception.

Thirty right-handed participants with normal or corrected-to-normal vision engaged in a Touch-Perception-Task, exploring various textures. Think-aloud protocol captured real-time reflections on their visuo-tactile experiences, while self-reports detailed their sensory impressions, affective responses, personality traits, tactile inclinations. Eye-tracking technology recorded eye fixations, pupil dilation, paired with video analysis of hand movements to capture the nuances of material engagement. Our findings revealed distinct sensory, emotional profiles for different textures: sandpapers (K40, K1200) and silks elicited contrasting reactions, with K40 surprisingly perceived as pleasant due to its larger, smoother particles, subtle vibrations, while the finer K1200 was found irritating and visually disengaging. Faux fur emerged as the favourite, evoking feelings of comfort, safety. Analysis of hand movements showed non-traditional tactile exploration, suggesting that cognitive, emotional factors shape our aesthetic interaction with materials.

This integrative approach, sheds light on the cognitive-affective interplay of visuo-tactile experiences. Our findings indicate that visual complexity, the alignment/misalignment between visual anticipation, tactile reality, and material qualities like texture and vibration significantly shape aesthetic judgments. This research enriches our understanding of sensory integration, offering insights into the layered complexities of material perception beyond isolated sensory assessments.

**Keywords:** Perception, Aesthetics, Multisensory perception, Haptic aesthetics, Visuo-tactile perception, Textures perception, Visuo-tactile exploration.

**Presentation type:** Original Research Talk

**Session:** Experimental aesthetics: Different fields

---

## **Dimensions of stylistic preferences: Likes and dislikes of different musical styles**

Emily Gernandt <sup>1, 2\*</sup>, Julia Merrill <sup>1, 2</sup>

<sup>1</sup> *Max Planck Institute for Empirical Aesthetics, Frankfurt am Main, Germany*, <sup>2</sup> *Institute of Music, University of Kassel, Kassel, Germany*

**Introduction.** While previous musicological research has broadly addressed the functions and strategies explaining musical judgments, specific musical styles have received less attention. This study explores musical taste explanation strategies across fans of EDM, jazz, classical, folk, metal, pop, rap, punk, and rock. The aim is to investigate how fans develop their preferences, the functions their preferred music serves, how they explain their taste, and how they respond to negative judgments.

**Method.** A total of N=844 participants selected one of 17 musical styles they were particularly passionate about. Four questionnaires were used, assessing factors influencing musical taste development, functions of music listening, musical value judgments, and possible rejection reasons by others. Data were analyzed using factor analysis, followed by random forest regression, to identify key predictors across styles, considering sociodemographics and musical engagement.

**Results.** Key predictors for style classification included social factors, which were crucial in shaping musical taste, particularly for punk, metal, and rock. In contrast, these factors were irrelevant for classical and jazz. Personality expression and the significance of lyrics were highly important for punk, metal, and rock fans. Pop and rap listeners cited the perception of their music as mainstream as a key reason for its rejection by others, while classical, metal, and rap fans pointed to prejudices as an important factor in negative judgments.

**Conclusion.** The findings highlight the importance of style-specific approaches in understanding musical taste, revealing significant differences in the musical taste explanation strategies across styles. Further research should continue to explore these nuanced distinctions.

**Keywords:** musical taste, style-specific, musical value judgments, preferences, dislikes

**Presentation type:** Original Research Talk

**Session:** Experimental aesthetics: Different fields

## EXPERIMENTAL AESTHETICS: PAST AND FUTURE

---

### **Ten years of experimental studies on visual preference for curvature.**

Enric Munar \*, Erick Chuquichambi

*University of the Balearic Islands*

In 2014, we presented “Visual Preference for Curvature as a Potential Aesthetic Primitive” at the IAEA conference. Ten years and fourteen studies later, we will show some conclusions. We found the effect of preference for curvature in small-scale societies relatively uninfluenced by Western culture. We also found it in great apes. The effect size is bigger in meaningless patterns than in images of real objects. We found that we react faster to circles than triangles, contrary to some studies. We also found that the effect is mainly caused by an inclination toward curved contours and not by rejecting sharp-angled contours. We showed that familiarity does not explain the effect. We found that curved drawings are preferred to draw than sharp-angled ones. We also found the effect in paintings, both in the lab with digital paintings and in museums, with the original artworks. We also have found a remarkable breadth of variation among participants in most of our studies. In a systematic meta-analysis, we found a medium effect size of the visual preference for curvature that is moderated by presentation time, stimulus type, expertise, and task. The results suggested that the effect is a reliable but not a universal phenomenon. However, we advocate that the effect seems innate as it manifests itself behaviourally in certain situations that favour its appearance. We will propose the next steps to try to find out more about this effect.

**Keywords:** Visual preferences, empirical aesthetics, preference for curvature.

**Presentation type:** Original Research Talk

**Session:** Experimental aesthetics: Past and future

## **Aesthetic experience and artificial intelligence: Reflecting an example**

Aniko Illes \*, Klaus Kellerwessel , Bernadett Palko-Arndt

*Moholy-Nagy University of Art and Design, Budapest, Hungary*

The empirical studies of the arts have been keeping the focus on the appreciation and creation of art even though the concept of art and the circumstance of the artistic experience is constantly changing. One of the new challenges came with the digital era. What kind of changes are detectable in the aesthetic process, if there's any? Artificial intelligence (AI) – assisted generative art, such as text-to-image systems, promises to democratize art creation, enabling individuals to visualize their inner worlds in ways previously inaccessible. But does this promise hold? Can AI-assisted generative art truly capture the nuances of our inner worlds and personal identity? In our study, 230 participants (mean age 21.54 years, SD = 2.12) were asked to create self-representative images using the text-to-image software Midjourney, guided by natural language prompts. Participants were given 45 minutes to create images. The image creation session was followed by a semi-structured interview, where participants reflected on their experiences, the creation strategies they used, and the images they produced. The study employed both quantitative methods (such as sentiment analysis of the image creation prompts and predicting psychological questionnaire results using machine learning algorithms) and qualitative ones (such as thematic and phenomenological analysis of the interviews and the images themselves). Together, these analyses suggest that AI-assisted art holds potential for both self-exploration, and it opens up new perspectives for empirical aesthetics.

**Keywords:** empirical aesthetics, AI-assisted generative art , self-representation

**Presentation type:** Original Research Talk

**Session:** Experimental aesthetics: Past and future

## **Gustav Theodor Fechner, the Holbein Controversy, and the Birth of Empirical Aesthetics**

Ronald Hübner \*

*University of Konstanz*

Gustav Theodor Fechner (1801-1887), the founder of psychophysics, is also known as the father of empirical aesthetics. He pioneered the collection of empirical data to answer aesthetic questions. His most notable survey was conducted during an art exhibition in Dresden, Germany, in 1871. The primary aim of the exhibition was to determine which of two famous paintings, both depicting the Madonna of Mayor Meyer, can be attributed to Hans Holbein the Younger (1497 - 1543). Fechner's data collection focused solely on the aesthetic preference between the two paintings. In this talk, I will describe the circumstances that sparked Fechner's interest in the Holbein controversy and his motivation for collecting preference data on this occasion. Both from today's perspective and from Fechner's viewpoint, the data collection and its results were disappointing. What would the results be today? To answer this question, I conducted a study that was comparable to Fechner's but using modern methods. The results are partly similar to his, but also offer new insights.

**Keywords:** Fechner, Holbein, Empirical Aesthetics

**Presentation type:** Original Research Talk

**Session:** Experimental aesthetics: Past and future

---

## **Intentions make artworks – at least for laypeople**

Gregor Hayn-Leichsenring \*

*University Hospital Jena*

There is often no consensus on whether something is an artwork or not. Nevertheless, people often judge whether an item qualifies as artwork. Here, laypeople's views on artworks and the impact of these views on judgments were investigated.

The term artwork cannot be generally defined. However, it can be approached from different perspectives (in our study, we included reception-aesthetic intentionalism, production-aesthetic intentionalism, historicism, essentialism, institutionalism and functionalism).

To investigate laypeople's opinions on the term artwork, 100 laypeople were asked how important the six perspectives are to decide whether an item is an artwork. Out of the six possible attributes (i.e., equal distribution would result in 16.7%), reception-aesthetic intentionalism (26.4%) and production-aesthetic intentionalism (19.8%) received the highest values. All other perspectives were below the equal distribution value.

Consecutively, the same laypeople were presented with images of 50 selected items and asked, whether it is an artwork or not (binary decision).

People who valued reception-aesthetic intentionalism highest were more likely to categorize certain items as artworks than those who did not value reception-aesthetic intentionalism. Examples for those items are Spiderman comics by Stan Lee and Steve Ditko, and the movie "2001 – A Space Odyssey" by Stanley Kubrick. The same was true for production-aesthetic intentionalism. Here, examples are an indigenous rain dance and the art installation "Irrational Geometrics" by Pascal Dombis. Overall, laypeople consider intentions as the most important aspect of artworks and, furthermore, their individual view on the term artwork influences personal categorization of objects as artworks.

**Keywords:** Aesthetics, Philosophy, Art, Language

**Presentation type:** Original Research Talk

**Session:** Experimental aesthetics: Past and future

---

## The perceptual, emotional and evaluative responses to traditional Chinese music

Elvira Brattico <sup>1, 2\*</sup>, Di Wu <sup>3</sup>, Mathias Klarlund <sup>1</sup>

<sup>1</sup> *Center for Music in the Brain, Department of Clinical Medicine, Aarhus University, Denmark,* <sup>2</sup> *Department of Education, Psychology, Communication, University of Bari, Italy,* <sup>3</sup> *Institute of Brain Science, Hangzhou Normal University, China*

During a musical aesthetic experience, the auditory-motor, emotional and evaluative responses are elicited in the brain. These responses have been deterministically related to music- and person-specific features in several studies focusing on Western music. Much less is known on how music- and person-specific features determine brain responses to a non-Western musical aesthetic experience. In a first electroencephalography (EEG) study, by using Chinese or German melodies, we investigated auditory responses in the brain to Chinese traditional music to answer the question

whether the neural responses to melody tones are affected by acculturation and cultural distance. In a second behavioral study, we looked into the impact of cultures and implicit attitudes on motor music-related responses by measuring synchrony during tapping of Chinese-Chinese or Danish-Danish participants as compared with mixed pairs. In a third EEG study, we focused on emotional and evaluative responses in the brain to naturalistic traditional Chinese music. The results highlight the complexity of the aesthetic musical experience when considering also the cultural dimension.

**Keywords:** music perception, audition, EEG, cross-cultural research, social interaction

**Presentation type:** Original Research Talk

**Session:** Experimental aesthetics: Past and future

# GOAL-ORIENTED INFORMATION PROCESSING: ADAPTIVE WORKING MEMORY

---

## Recall requirements can drastically modulate working memory representations in human visual cortex

Giuliana M. Giorjani <sup>1, 2\*</sup>, Rosanne L. Rademaker <sup>1</sup>

<sup>1</sup> *Ernst Strüngmann Institute (ESI) for Neuroscience in Cooperation with the Max Planck Society, Frankfurt, Germany*, <sup>2</sup> *Department of Cognitive Neuroscience, Vrije Universiteit Amsterdam, The Netherlands*

Visual working memory allows for temporary storage of relevant information to support adaptive behavior. Prior fMRI studies investigating passive storage have decoded mnemonic information from activity patterns in early visual cortex (EVC). Given that stored information is ultimately used to accomplish specific tasks, might EVC be involved during recall? Here, we manipulated recall requirements in an orientation memory task to investigate how adaptive behavior impacts EVC representations during recall. Specifically, we wanted to dissociate the roles of visual input, motor output, and online monitoring. To report a remembered orientation, participants (1) used “method-of-adjustment” button presses to rotate a thin dial on the screen, (2) viewed a “matched replay” of a pre-recorded response, and indicated a clockwise or counter-clockwise offset of the final dial orientation, (3) viewed a “mismatched replay”, i.e., a pre-recorded response to a random orientation, pressing a button if the dial crossed the remembered orientation, and (4) used button presses to rotate an “invisible dial”. We uncovered a drastic increase in decoding of the target orientation during recall when the remembered orientation matched the final dial orientation (“method-of-adjustment” and “matched replay” conditions). This implies that visual input alone (a rotating dial with final orientation unrelated to the remembered orientation, as in “mismatch replay”), motor output alone (high during “method-of-adjustment”, low during “matched replay”), or online monitoring alone (required during “mismatched replay”) cannot account for task-relevant feature decoding in EVC during recall. Our findings suggest amplified information in EVC when mnemonic contents match sensory input during recall.

**Keywords:**

**Presentation type:** Original Research Talk



**Session:** Goal-oriented information processing: Adaptive working memory

---

## **Working Memory benefits with meaningful stimuli: scaffolding or proactive interference?**

Wouter Kruijne \*, Mingmin Zhang , Elkan Akyurek

*University of Groningen*

Human minds have two seemingly different memory systems at their disposal: Working Memory (WM) holds currently relevant information, and Long-Term Memory (LTM) stores knowledge about the world at much longer time scales. However, the boundaries of these memory systems and their function are the subject of ongoing debate. In particular, much is unclear about how and when information in LTM can support maintenance in WM. In the context of this debate, recent work has shown that working memory precision of an individual feature (e.g., color) improves when presented as part of a real-world object stimulus, compared to 'blob' -stimuli that hold no other semantic information. It has been proposed that this performance benefit is due either to a 'scaffold' for WM maintenance provided by LTM knowledge, or to deeper processing of meaningful stimuli. Here, we investigate another explanation: Using meaningless or repeated simple stimuli fosters proactive interference across trials. Indeed, we show that WM benefits for real-world objects are attenuated if the objects are often repeated throughout a block, rather than them being unique on each trial. In a series of experiments, we investigate the nature of such proactive interference, and demonstrate how it affects WM fidelity. Based on our findings, we evaluate the role of knowledge in LTM as a way to assist WM, and discuss the complementary roles of these memory subsystems.

**Keywords:** working memory, perception, encoding, long-term memory, proactive interference

**Presentation type:** Original Research Talk

**Session:** Goal-oriented information processing: Adaptive working memory

## **Task status of previous items determines serial dependence in working memory**

Saskia Fohs <sup>1, 2\*</sup>, Cora Fischer <sup>1</sup>, Jochen Kaiser <sup>1</sup>, Christoph Bledowski <sup>1</sup>

<sup>1</sup> *Institute of Medical Psychology, Goethe University Frankfurt, Germany*, <sup>2</sup> *Visual Cognition & Computational Neuroscience Lab, Justus Liebig University Giessen, Germany*

Working memory (WM) provides moment-by-moment information that is no longer physically present but relevant for a cognitive task. According to current task requirements, WM encodes new items, prioritizes items that become action targets or deprioritizes outdated or already used items. Since representations in WM are not independent of each other, such changes in task status might result in systematic inter-item biases. The most prominent bias is serial dependence where a previous item attracts a current item. It remains unclear under which task conditions serial dependence occurs. In two experiments, we asked participants to memorize the orientation of a briefly presented noisy grating of interest for a delayed report. Prior to its presentation, participants encoded two inducer gratings into WM. A retro-cue indicated that one of these inducer gratings had to be kept in WM. The other inducer grating was either used for a secondary judgment task but became irrelevant for the report (used but irrelevant inducer) or was not used for any other task (unused and irrelevant inducer). We found that the grating of interest was attractively biased towards the used but irrelevant inducer. In contrast, there was no serial dependence when the inducer was unused and irrelevant. Interestingly, the inducer remaining in WM repulsed the grating of interest. Our results showed that WM integrates a previous item into a current item only if the previous item was used for an action before losing its task-relevance. Thus, serial dependence in WM relies on action-related rather than stimulus-related representations.

**Keywords:** Working Memory, Serial Dependence, Visual Bias

**Presentation type:** Original Research Talk

**Session:** Goal-oriented information processing: Adaptive working memory

## The role of motor representations for working memory when dealing with interference

Sahcan Özdemir <sup>1\*</sup>, Eren Günseli <sup>2</sup>, Daniel Schneider <sup>1</sup>

<sup>1</sup> *Leibniz Research Centre for Working Environment and Human Factors, Dortmund, Germany,* <sup>2</sup> *Sabanci University, Istanbul, Turkey*

Working memory (WM) maintains task-relevant information and is closely linked with action planning. We examined how this relationship affects WM updating using a delayed-match-to-sample task in a preregistered study (OSF). Participants memorized a target-colored shape and, after a retention, identified its color on a color wheel. The shape of the target color indicated which hand they should use to adjust the color wheel. During retention, participants completed a secondary task requiring a response with either the right or left hand, which either matched or mismatched the target hand from the main task. This secondary task introduced either motor interference or visuomotor interference, the latter involving a randomly colored task cue. We hypothesized that (I) action plans would form simultaneously during WM encoding, (II) visuomotor interference would disrupt target representation more than motor interference, and (III) the interference involving the same hand as the main task would trigger WM updating. First, EEG analysis revealed mu/beta suppression during WM encoding, suggesting simultaneous preparation of action plans. Second, visuomotor interference impaired target representation more than motor interference, as evident in main task errors. Finally, when the interfering action involved the same hand as the main task, it triggered WM updating, reflected by a stronger attraction bias of the target color toward the interfering color. This correspondence also resulted in differences in frontal theta activity, which is associated with WM gating processes. These findings suggest that shared motor components between planned actions and interference lead to further processing of sensory information through WM updating.

**Keywords:** working memory, action, motor control, attention, working memory gating, EEG

**Presentation type:** Original Research Talk

**Session:** Goal-oriented information processing: Adaptive working memory

## **Saccadic selection in vision and memory**

Sven Ohl \*

*Humboldt-Universität zu Berlin, Germany*

Humans perceive new incoming visual signals while simultaneously maintaining consolidated memory representations to guide future actions. Saccadic eye movements constitute a spatial selection mechanism both in vision and in visual working memory — perception and memory are better at the saccade target location than elsewhere in the visual field. Here, we set out to investigate how saccades orchestrate selection in vision and memory simultaneously. We asked observers to hold oriented stimuli in memory for a later memory test and to generate a saccade at varying movement cue delays to an indicated location. Moreover, we presented visual stimuli (i.e., task-relevant orientations vs. task-irrelevant flashes) around the onset of the saccade and investigated whether the automatic presaccadic attention shift in vision interfered with saccadic selection in visual working memory. We found that memory performance was better at the saccade target location than at locations incongruent with the saccade target. This memory advantage at the saccade target location, however, was limited to short movement cue delays. Importantly, the presence of visual stimuli around a saccade interfered with memory performance when the stimuli shared relevant features with the maintained representations in visual memory. Overall, our results show successful saccadic selection in visual working memory despite the presentation of new visual input. However, we observed a conflict when the visual stimulus and the maintained representations shared the same feature dimension. Thus, in our experiments, saccadic selection in visual working memory did not operate independently of ongoing visual processing.

**Keywords:** Visual memory, eye movements, saccades, attention

**Presentation type:** Original Research Talk

**Session:** Goal-oriented information processing: Adaptive working memory

# UNDERSTANDING THE POWER OF VOICE: INSIGHTS FROM EMOTION, NEURAL MECHANISMS AND INDIVIDUAL DIFFERENCES

---

## Recognizing social communicative intentions in the voice: A cross-cultural comparison

Daniela Sammler <sup>1, 2\*</sup>, Tessa Cancio Pastor <sup>1, 3</sup>, Yun Nan <sup>4</sup>

<sup>1</sup> Max Planck Institute for Empirical Aesthetics, Research Group Neurocognition of Music and Language, Frankfurt am Main, Germany, <sup>2</sup> Max Planck Institute for Human Cognitive and Brain Sciences, Department of Neuropsychology, Leipzig, Germany, <sup>3</sup> University of Pavia, Department of Humanities, Pavia, Italy, <sup>4</sup> Beijing Normal University, State Key Laboratory of Cognitive Neuroscience and Learning, Beijing, China

During verbal communication, humans decode not only what is said but also why. Previous research has shown that specific prosodic patterns in a speaker's voice transmit these communicative intentions. It remains, however, unclear whether these patterns are understood across cultures and languages. This is particularly relevant for interactions between speakers of tonal and non-tonal languages, such as Mandarin Chinese and German, which differ in their lexical vs. pragmatic use of pitch. In this series of behavioural experiments, we investigated the extent and origins of cross-linguistic prosodic misunderstandings, and whether they could be alleviated either by musical training known to improve prosody perception or by exposure to the non-native language and culture.

German and Chinese listeners categorized (Experiment 1) and rated (Experiment 2) six intentions (e.g., suggestion, criticism, wish) expressed prosodically by native speakers of German and Mandarin Chinese uttering disyllabic words. Accuracy and confusion patterns suggest that both listener groups use decoding strategies specific to their native language, that are partly inadequate to understand intentions in non-native prosody, although a range of common acoustic cues to intentions in both languages secure basic cross-linguistic comprehension. A comparison between musicians and nonmusicians (Experiment 3), and between Chinese listeners with and without German cultural experience (Experiment 4) suggest that, even though musical training may sharpen

the auditory encoding of prosodic cues, cultural exposure may be necessary to increase awareness for non-native cues in a speaker's voice and to support mutual understanding.

**Keywords:** voice, prosody, intentions, cross-cultural, cross-linguistic, communication

**Presentation type:** Original Research Talk

**Session:** Understanding the power of voice: Insights from emotion, neural mechanisms and individual differences

---

## Influence of acute and long-lasting stress on voice perception

Maren Schmidt-Kassow \*

*Clinic of Psychiatry, Frankfurt*

Over the past 150 years, linguistic processes have been extensively studied, leading to insights into the brain areas involved in speech production and perception, specializations for different linguistic levels, and how these processes interact in real time. Despite this growing body of knowledge, surprisingly little is known about how different states of arousal affect language processing.

This presentation focuses on two experiments examining the effects of long-term and acute stress on emotion recognition in speech, including the role of social support in the acute stress condition.

Our findings reveal that women generally outperform men in recognizing vocal emotions. Under moderate prolonged stress, men's ability to detect sadness declined, while women remained unaffected. In acute stress, gender differences disappeared, but stress without social support heightened the detection of negative emotions—a pattern not seen when social support was present.

These results underscore the complex effects of prolonged and acute stress on emotional voice recognition, with key roles for gender and emotional valence.

**Keywords:** voice perception, affective prosody, emotion, stress

**Presentation type:** Original Research Talk

**Session:** Understanding the power of voice: Insights from emotion, neural mechanisms and individual differences

## **Forming first impressions from voices**

Nadine Lavan \*

*Queen Mary University of London*

Listeners very quickly form impressions of a person from their voice: Is someone old or young? Trustworthy or untrustworthy? Do we think they are a nice person? I will present behavioural and electrophysiological evidence to examine how these very first impressions from voices are formed. First impressions can be formed rapidly, within less than a second of exposure. Impressions of physical characteristics of a person, such as age and gender seem to be formed first, with inferred characteristics, such as trustworthiness or educatedness, following later

**Keywords:** voice, first impressions, person perception

**Presentation type:** Original Research Talk

**Session:** Understanding the power of voice: Insights from emotion, neural mechanisms and individual differences

---

## **Perceiving voices through predictions and errors: from neural mechanisms to clinical implications**

Ana Pinheiro \*, Maria Amorim

*Faculdade de Psicologia, Universidade de Lisboa*

How do we ensure adaptive and veridical perception in a continuously changing and often ambiguous sensory environment? The capacity to predict what should happen next and to minimize any mismatch between expected and actual sensory input is a central aspect of perception, including the perception of voices. Alterations in predictive processes, such as aberrant encoding of prediction errors, have been proposed to account for auditory verbal hallucinations, which exist on a continuum with normal experience. We will present behavioral and EEG studies that illustrate how alterations in the dynamic neurocognitive operations that take place when we predict, detect, and react to unexpected changes in voice stimuli may underlie phantom voice perception.

**Keywords:** voice, perception, prediction, prediction error, hallucinations, EEG.

**Presentation type:** Original Research Talk

**Session:** Understanding the power of voice: Insights from emotion, neural mechanisms and individual differences

---

## The Impact of Voice: Shaping Listener Reactions and Emotions

Silke Paulmann \*

*University of Essex, Department of Psychology and Centre for Brain Sciences*

Research on voice perception has extensively explored its time-course and neural mechanisms, yet less attention has been given to how speakers influence listeners' emotions and behaviour. This presentation will discuss a series of studies examining how different voice qualities affect listeners' behaviours (e.g., cooperation, prosocial actions) and emotional responses (e.g., affect, satisfaction of psychological needs). Focusing on motivational, emotional, and attitudinal voice patterns, and considering individual differences (e.g., stress, empathy), the findings demonstrate that the way we are spoken to significantly impacts our physiology, behaviour, and emotional well-being. For instance, listening to happy voices, compared to angry ones, enhances positive emotional reactions, while pressuring voices increase stress levels, as reflected in heart-rate variability data. These insights reveal the powerful influence of voice and suggest practical applications in fields such as education, healthcare, and occupational settings.

**Keywords:**

**Presentation type:** Original Research Talk

**Session:** Understanding the power of voice: Insights from emotion, neural mechanisms and individual differences



# HOW CAN WE RELIABLY AND VALIDLY MEASURE COGNITIVE CONTROL?

---

## Where to go from here – reliability and validity issues in cognitive control

Miriam Gade \*, Alodie Rey-Mermet

*Medical School Berlin*

Where to go from here – reliability and validity issues in cognitive control

The last talk will conclude the symposium “How can we reliably and validly measure cognitive control?” by integrating and discussing the results presented during the symposium. To this end, we plan to address the following key questions: (a) What does trial selection really buy us? (b) How do we integrate dynamics in cognitive processes within and between participants? (c) What are the criteria for making an experimental condition a sound manipulation to measure cognitive control? d, how do we conceptualize cognitive control in the face of novelty and stability. Overall, the symposium should offer a unique opportunity for discussion between speakers and audience members on the current challenges we are facing when we aim to measure cognitive control reliably and validly.

**Keywords:** Discussion Symposium, cognitive control reliability validity

**Presentation type:** Original Research Talk

**Session:** How can we reliably and validly measure cognitive control?

---

## Rethinking the Reliability Paradox

Julia Haaf \*

*University of Potsdam*

The reliability paradox has commonly been described as the observation that cognitive tasks such as the Stroop task produce robust group-level effects but unreliable individual differences. There has been much attention on increasing the reliability, either by increasing the number of trials or by changing the cognitive measure (i.e., accuracy effects rather than response time effects). Both of these approaches are based on the assumption that individual performance in these tasks is all over the place, just too noisy to learn about their latent cognitive abilities. This assumption, however, needs to be checked. To do so, I investigated individual performance over the course of one experiment, assessing how variable cognitive effects are within and across individuals. The results show surprising stability when enough trials are considered, even across experimental sessions. I argue that we therefore need to rethink the reliability paradox as not being a paradox at all: Cognitive tasks produce replicable group-level effects because these effects are consistent within and between individuals. This consistency of individual effects leads to consistently small individual variability within experiments and therefore small correlations of individual performance across experiments. Ultimately, we are not dealing with a reliability paradox but with a reliability corollary.

**Keywords:** reliability paradox, attentional control

**Presentation type:** Original Research Talk

**Session:** How can we reliably and validly measure cognitive control?

---

## When control measures actually measure control.

Luca Moretti <sup>1\*</sup>, Iring Koch <sup>1</sup>, Claudia von Bastian <sup>2</sup>

<sup>1</sup> RWTH Aachen University, <sup>2</sup> University of Sheffield

Cognitive control is often conceptualized as a set of abilities allowing to pursue current goals. Popular models have therefore partitioned cognitive control into different subcomponents, but recent findings question the validity of some of these constructs. Prominently, the construct validity of

inhibition has been questioned given the low correlations observed between performance in tasks putatively measuring it, such as the Simon and the Stroop. However, this debate is further complicated by the possibility that the observed low correlations arise due to measurement error, as congruency effects typically display low reliabilities. In the present study, we took a theoretically-informed approach to these issues. Based on classic findings in experimental research, we argue that control abilities are adequately captured only in those subsets of trials where they are most needed. Therefore, restricting data analysis to those subsets, should improve both validity and reliability of control measures. In Experiment 1 we show that focusing on trials where inhibition is most required (i.e., post-congruent and fast-response trials), significantly increased both the split-half reliability and between-task correlations of congruency effects in the Stroop and Simon tasks. In Experiment 2 we extended our theoretical approach to task switching, where we reasoned that shifting would be better captured when excluding the first trial of a repetition run. Although the switch cost is known to be a relatively reliable measure, we could show that both split-half and test-retest reliabilities were improved when excluding first repetitions. Our results highlight the utility of integrating experimental-research findings in inter-individual differences studies.

**Keywords:** Cognitive control, Reliability, Validity, Stroop, Simon

**Presentation type:** Original Research Talk

**Session:** How can we reliably and validly measure cognitive control?

---

## Cognitive control: What challenges are we facing?

Alodie Rey-Mermet <sup>1, 2\*</sup>, Miriam Gade <sup>3</sup>

<sup>1</sup> *Vinzenz Pallotti University*, <sup>2</sup> *UniDistance Suisse*, <sup>3</sup> *Medical School Berlin*

Cognitive control has been defined as the processes underlying goal-directed behavior in the face of distraction. Previous research has highlighted two major difficulties in measuring these processes. First, the measures used to assess cognitive control have been reported to have low reliability (i.e., low correlations between two sessions or between two different halves of the same session). Second, the correlations among different measures of cognitive control have been reported to be low. Together, these difficulties challenge the view that cognitive control or its subprocesses can be measured with several tasks. Critically, these issues have been attributed to methodological issues, such as: (a) the use of difference scores as measures of cognitive control,

(b) the difficulty of isolating attentional control from measurement error, and (c) the computation of the cognitive-control measures based on either reaction times or accuracy rates, which neglects individual differences in speed-accuracy trade-offs. Several solutions have been proposed to improve the measurement of cognitive control. The question we face is to what extent these improvements change the validity of the cognitive-control measures. The purpose of this talk is to present the current difficulties in measuring cognitive control. The subsequent talks will explore solutions to the dilemma between reliability and validity in measuring cognitive control.

**Keywords:** attentional control, inhibition, executive functions, measurement

**Presentation type:** Original Research Talk

**Session:** How can we reliably and validly measure cognitive control?

---

## Does trial selection improve the reliability and correlations of cognitive control measures?

Niels Kempkens <sup>1\*</sup>, Julia Haaf <sup>2</sup>, Anna-Lena Schubert <sup>3</sup>, Alodie Rey-Mermet <sup>1, 4</sup>

<sup>1</sup> UniDistance Suisse, <sup>2</sup> University of Potsdam, <sup>3</sup> University of Mainz, <sup>4</sup> Vinzenz Pallotti University

Typically, cognitive control is assessed using tasks triggering a conflict between two responses. In these tasks, the measure is the congruency effect. This is computed as the performance difference between trials triggering a response conflict (thereafter called incongruent trials) and trials triggering no or low response conflict (congruent trials). Previous research has often reported low reliability for these measures. Furthermore, the correlations between the congruency effects of different tasks have been shown to be low. Moretti et al. (2023) have suggested solving these measurement problems by selecting the trials with the largest congruency effects, such as the trials following congruent trials. Using this approach, Moretti et al. (2023) reported higher reliability estimates and correlations. We addressed two limitations of this approach. First, one may argue that congruency effects may be more valid following incongruent trials because these trials have been reported to trigger an upregulation of cognitive control. A second limitation may be the reliability metric used by Moretti et al. (2023). This was sensitive to the number of trials and their correction accounting for this may have artificially increased the estimates. We addressed both limitations by analyzing the congruency effect following incongruent trials and by using the signal-to-noise ratio, a reliability metric independent of the number of trials. In a first preliminary analysis including one dataset with

eight tasks, selecting trials did not consistently result in higher reliability. Thus, these results seem to suggest that this trial selection does not solve the reliability problem recognized in the field.

**Keywords:** cognitive control, reliability

**Presentation type:** Original Research Talk

**Session:** How can we reliably and validly measure cognitive control?

---

## Instruction-based learning

Hannes Ruge \*

*TU Dresden, Germany*

Instructions have long been considered a highly efficient route to knowledge acquisition. To enable actual instruction implementation, initial declarative representations are often assumed to be transformed into actionable procedural ones. We employed different study designs that allowed us to examine the influence of learning intention, instruction repetition, as well as working memory load and span. Moreover, we tested the hypothesis that declarative-procedural transformation should be bound to a specific response modality and not be transferable across different modalities. First, our results suggest that instruction-based learning involves active intention to learn. Second, compared to trial-and-error learning, repeated instruction implementation accelerates short-term automatization while saving on working memory resources. Third, procedural encoding is modality-specific as indicated by an implicit priming test. This contrasted with explicit test performance, serving as a marker of declarative encoding, which was independent of modality transition and uncorrelated with implicit test performance. Fourth, we found that procedural encoding occurs also in the absence of overt instruction implementation. Fifth and surprisingly, both implicit and explicit test scores benefited from previously non-implemented instructions compared to previously implemented instructions. Overall, our results provide clues how to learn efficiently via explicit instructions.

**Keywords:** instruction-based learning

**Presentation type:** Original Research Talk

**Session:** How can we reliably and validly measure cognitive control?

# TEMPORAL ACTION-EFFECT BINDING: CAUSES AND IMPLICATIONS

---

## The role of visuospatial attention in temporal binding

Liyu Cao \*

*Department of Psychology and Behavioural Sciences, Zhejiang University, The State Key Lab of Brain-Machine Intelligence, Zhejiang University*

Temporal binding is considered as an illusion of timing perception, in which an action (e.g. a keypress) and its action-effect (e.g. a sound with a 250 ms delay after the keypress) are perceived to temporally attract towards each other. The event timing perception is usually measured by asking participants to report the position of a fast-rotating clock hand at the time of event onset. For example, when reporting the time of a sound onset, the reported clock hand was at an earlier position when it was preceded by a keypress than when not, which was taken as the evidence that the sound was perceived to occur earlier when it was triggered by a keypress than when presented alone. We show here that the distribution of visuospatial attention could explain the temporal binding effect. In the case of making a keypress to trigger a sound, stronger visual attention was found at early clock hand positions when judging the sound time and at late clock hand positions when judging the action time, compared to when the keypress or the sound was presented alone. Furthermore, experimentally manipulating the distribution of visual spatial attention resulted in predicted changes in timing reports. Finally, the temporal binding effect could be reproduced through cognitive modelling using the attention data alone as input. Our results suggest that visuospatial attention is at least a confound that should be controlled for before any conclusion about timing perception can be drawn when using the clock method.

**Keywords:** attention, temporal binding, action, Libet clock, sense of agency

**Presentation type:** Original Research Talk

**Session:** Temporal action-effect binding: Causes and implications

## Individual differences in the Temporal Binding effect

Pernille Hemmer \*, Laura Saad

*Rutgers University*

It is not well understood how people derive a sense of agency (SoA) over their actions and associated outcomes. The temporal binding (TB) effect, the most widely used implicit measure of SoA, is defined as the perceived subjective compression of the time interval between a voluntary action and its associated outcome relative to the perceived interval between two passively observed events. Recent evidence suggests TB is a methodological artifact, raising questions regarding its apparent link to SoA. We further contribute to this questioning by investigating whether the TB effect is consistently present at the individual level. To do so, we reanalyzed 10 TB data sets to reveal consistent individual variability in the empirical signature of the TB effect. To rule out measurement noise as an explanation, we implemented a Bayes factor mixed method modeling approach (Haff & Rouder, 2017) which simulated participant true effects (accounting for sampling noise) from 2 temporal binding data sets. This confirmed that up to 40% of individuals in the sample have true effects in the opposite of the theoretically predicted direction. These results implicate both the theories posed to describe TB as well as the use of TB in applied contexts.

**Keywords:** Temporal Binding; Individual Differences; Bayesian modeling

**Presentation type:** Original Research Talk

**Session:** Temporal action-effect binding: Causes and implications

---

## Temporal Expectations Shape Binding: Contextual Modulation of Perceived Action-Effect Timing

Julian Gutzeit \*

*University of Würzburg*

Temporal binding, the perceived compression of time between voluntary actions and their effects, is a key implicit measure of the sense of agency. Previous studies have shown that temporal binding is strongest when the effect follows the action with close proximity of approximately 200 ms.

However, it remains unclear whether this optimal temporal proximity is a fixed feature of cognitive processing or adaptable to contextual changes.

In this study, participants performed key presses that triggered auditory effects after specific default time intervals, with occasional unpredictable "oddball" intervals. Participants were divided into two groups: one experienced a default action-effect interval of ~200 ms with oddball intervals of ~550 ms ("short-default"), while the other group experienced the reverse ("long-default"). Using a Libet clock, participants estimated the timing of both their actions and the effects.

Our findings revealed that in the short-default group, significant action-effect binding occurred in both trial types, with stronger binding for longer delays. In contrast, in the long-default group, binding was markedly reduced or even completely eradicated, even for the shorter intervals that are typically associated with stronger temporal binding. These results suggest that temporal expectations and context can dynamically recalibrate temporal distortions, highlighting the flexibility of temporal binding in response to environmental cues.

This study provides new insights into how temporal distortions may be modulated by context, challenging the notion of temporal proximity as a fixed cognitive mechanism in temporal binding.

**Keywords:** Temporal Binding, Sense of Agency

**Presentation type:** Original Research Talk

**Session:** Temporal action-effect binding: Causes and implications

---

## The Role of Causal Inference in Temporal Binding: A Verbal Task Approach

Carmelo P. Cubillas <sup>1\*</sup>, Helena Matute <sup>2</sup>

<sup>1</sup> *Autonomous University of Madrid*, <sup>2</sup> *University of Deusto, Bilbao*

The temporal binding effect refers to the tendency to perceive two events as occurring closer together in time than they actually did. While various explanations for this phenomenon exist, one of the most widely supported suggests that temporal binding happens when participants infer a causal relationship between the events. Traditionally, this effect has been studied using tasks where



participants, in a trial-by-trial procedure, must infer the causal connection between events. However, humans are also capable of acquiring knowledge verbally, without directly experiencing the stimuli. In six experiments, we demonstrate the temporal binding effect using a verbal task. Instead of exposing participants to physical events, they were presented with a list of fictitious events verbally. Later, some participants were verbally informed of a causal relationship between two of these events. Those who received the causal information judged the events to be closer in time than participants who did not receive this information. These findings support the idea that causality drives the temporal binding effect and introduce a new, more ecological paradigm for studying this phenomenon.

**Keywords:** temporal binding, causality, verbal instruction, time estimation, causal binding

**Presentation type:** Original Research Talk

**Session:** Temporal action-effect binding: Causes and implications

---

## Dynamic adjustment of temporal action estimates

Annika L. Klaffehn \*

*University of Würzburg*

If actions generate slightly delayed effects, these actions and effects are estimated to have shifted towards each other in time. The functional mechanisms for this finding of temporal action-effect binding are not yet fully understood and range from intention or causality to multimodal cue integration. I present an intriguing finding of dynamic readjustment of action estimations across studies. If an action is estimated repeatedly under constant conditions, estimations will gradually shift towards an earlier mean, but revert when conditions change. This is especially true if actions engender effects or new action-effect contingencies need to be learned. These findings offer up a novel approach to temporal action-effect binding under consideration of learning aspects.

**Keywords:** temporal binding, action-effect learning

**Presentation type:** Original Research Talk

**Session:** Temporal action-effect binding: Causes and implications

# NEUROMODULATION AND COGNITIVE FUNCTIONING: INSIGHTS FROM EXPERIMENTAL PSYCHOPHARMACOLOGY

---

## GABAergic Involvement in Selective Attention

Kaja Faßbender \*

*University of Bonn, Department of Psychology, Cognitive and Experimental Clinical Psychology*

Living organisms rely on selective attention to navigate through abundant sensory information efficiently. While the cortical networks of selective attention have been extensively studied, the role of the major inhibitory neurotransmitter  $\gamma$ -aminobutyric acid (GABA) is less well understood. Increased GABA<sub>A</sub> receptor activity due to benzodiazepine administration such as lorazepam has long been known to slow down psychomotor performance and in a previous study, we have obtained first evidence that increased GABA<sub>A</sub> receptor activity may impair selective attention. However, it remained unclear, whether observed impairments stem from a slowed build-up of selectivity, consistent with benzodiazepine induced slowing of other processes, or from a generally widened attentional focus. To address this gap,  $N=29$  healthy participants received lorazepam (1mg; placebo-controlled, within-subjects design) and performed an extended version of the arrowed flanker task, systematically varying the number and position of incongruent flankers. Under lorazepam, incongruent flankers close to the target impaired performance more strongly than flankers located more distantly, whereas under placebo only the number of incongruent flankers, but not their position, had a significant effect. Delta plot analyses of reaction time showed that this effect persisted for slow reactions, suggesting a widening of attentional focus that is distinct from general mechanisms of slowing. These findings underscore the role of GABAergic modulation in selective attentional processes and highlight the need for further exploration into neurotransmitter systems underlying selective attention.

**Keywords:** lorazepam, benzodiazepine, selective attention, interference control, Eriksen flanker, delta functions

**Presentation type:** Original Research Talk

**Session:** Neuromodulation and cognitive functioning: Insights from experimental psychopharmacology

---

## **Effects of Lorazepam on Saccadic Eye Movements – Evidence from Prosaccade and Free Viewing Tasks**

Philine Baumert \*

*University of Bonn, Department of Psychology, Cognitive and Experimental Clinical Psychology*

One of the most reliable findings in psychopharmacological research is that peak velocities of saccadic eye movements are reduced after benzodiazepine administration. It is viewed as a biomarker of benzodiazepines' sedative side effects. Even though this is a very established effect, past research has only examined this in horizontal saccades during standardised prosaccade tasks. The spectrum of saccadic eye movements however, is much larger. To make a first attempt at filling this research gap, 1mg lorazepam or placebo was administered (within-subjects, double-blind, in randomised order) to a sample of healthy adults. Participants then performed an extended version of the prosaccade task, including vertical saccade directions and different stimulus eccentricities, as well as a free viewing task. Results from the prosaccade task confirmed established effects of benzodiazepines as well as saccade directions on saccadic parameters but additionally showed that the benzodiazepine effect on peak velocity is independent of saccade direction. This further consolidates saccadic peak velocity's status as a biomarker of sedation. Remarkably, in the free viewing task peak velocities as well as other saccade parameters were unaffected by benzodiazepine. Furthermore, exploration patterns in the free viewing task did not change after lorazepam administration. Overall, these results suggest that sedative effects of benzodiazepines may be compensated in tasks that more closely resemble natural eye movement behaviour, possibly via the additional involvement of neurophysiology related to voluntary saccades and the absence of time constraints.

**Keywords:** lorazepam, benzodiazepine, saccadic eye movements, biomarker, prosaccades, free viewing, peak velocity

**Presentation type:** Original Research Talk

**Session:** Neuromodulation and cognitive functioning: Insights from experimental psychopharmacology

## **Methylphenidate as a Probe for Catecholaminergic Modulation of Response Inhibition, Event File Binding and Event Segmentation**

Astrid Prochnow \*

*Cognitive Neurophysiology, Department of Child and Adolescent Psychiatry, Faculty of Medicine,  
TU Dresden*

Catecholamines exert significant influence over various cognitive functions, and their modulation via methylphenidate (MPH), a reuptake inhibitor, has been investigated in several studies. The presented work examines the effects of pharmacological manipulation using MPH on two specific cognitive processes: event file binding in response inhibition and event segmentation behavior. Examining the effects of MPH on event file (re)binding processes in response inhibition, we find that MPH enhances overall inhibition performance while diminishing binding effects. However, this effect exhibits considerable variability, consistent with findings from diverse studies and clinical applications, where MPH-based medication responses in conditions such as ADHD vary widely. Subsequent analysis of task-unrelated theta band modulability reveals that individuals we categorized as "high modulators" demonstrate benefits in both inhibition and binding, whereas "low modulators" only experience improvements in inhibition. Regarding event segmentation behavior, which reflects the automatic partitioning of continuous streams of information, we observe that the relationship between changes in the environment and event segmentation behavior is influenced by MPH administration. Notably, this effect is contingent upon the familiarity with the stimulus material, indicating that situational context plays a crucial role in shaping cognitive responses. These findings provide nuanced insights into the effects of MPH-induced catecholaminergic modulation on cognitive processes, while also highlighting the relevance of individual differences and contextual factors in research regarding the neurobiological underpinnings of cognitive functions.

**Keywords:**

**Presentation type:** Original Research Talk

**Session:** Neuromodulation and cognitive functioning: Insights from experimental psychopharmacology

## Insights to Receptor-Receptor Interactions through Caffeine Effects: A Pharmacological PET-fMRI Study

Yu-Shiuan Lin \*

*Athinoula A. Martinos Center, Mass General Hospital, Harvard Medical School, USA, Centre for Chronobiology, University Psychiatric Clinics Basel, Switzerland*

Caffeine is an adenosine receptor antagonist and the most commonly used psychostimulant functioning through enhancing striatal dopamine signaling. *In vitro* evidence reveals that adenosine 1A (A<sub>1</sub>R) and 2A receptors (A<sub>2A</sub>R) in the striatum form functional heterodimers respectively with dopamine D1 (D<sub>1</sub>R) and D2 receptors (D<sub>2</sub>R) and exert allosteric antagonism. Adenosinergic modulation therefore is believed to be critically involved in dopamine-associated psychiatric disorders. However, *in vivo* characterization of adenosine-dopamine interactions and its modulation of neurocognitive functions remain scarce. In a joint project between Mass General Hospital and University Psychiatric Clinics Basel, we characterized adenosine-dopamine interactions using multimodal pharmacological imaging and pharmacobehavioral models. First, we examined changes in D<sub>2</sub>R availability and the associated hemodynamic response to rewards, using [<sup>11</sup>C]Raclopride PET/fMRI after acute caffeine administration. Further, to understand the adaption in adenosine-dopamine modulation over chronic adenosine antagonism, we measured positive and negative reinforcement learning after subchronic caffeine intake compared to acute caffeine and placebo. We found that caffeine acutely increased striatal D<sub>2</sub>R availability and elevated neural activity in medial prefrontal cortex, anterior and middle cingulate cortices, and hippocampus during reward feedback. Furthermore, caffeine generally improved learning outcomes, with an accelerated learning curve in acute caffeine condition. Interestingly, subchronic caffeine enhanced positive reinforcement learning whereas acute caffeine worsened it. Exploratory analyses suggested that acute caffeine elevated salience towards positive reinforcers, thereby blurring the distinction between different reinforcement strengths. Our data highlight the adenosine-dopamine interaction and its modulation of neurocognitive functions.

**Keywords:** pharmacological imaging, PET/fMRI, receptor-receptor interactions, adenosine, dopamine

**Presentation type:** Original Research Talk

**Session:** Neuromodulation and cognitive functioning: Insights from experimental psychopharmacology

## FROM BABIES TO SEMANTICS: LEVERAGING LANGUAGE MODELS AS TOOLS FOR PSYCHOLINGUISTIC RESEARCH

---

### **Can Large Language Models (LLMs) describe pictures like children? A comparative corpus study.**

Hanna Woloszyn <sup>1, 2\*</sup>, Benjamin Gagl <sup>1, 2</sup>

<sup>1</sup> University of Cologne, <sup>2</sup> Self Learning Systems Lab

Recent developments in Large Language Models (LLMs) have introduced new opportunities for linguistic research. This study explores whether LLMs can replicate children's language by comparing an LLM-generated corpus to the Litkey Corpus, a collection of German children's texts describing a set of eight picture stories. First, we generate the same number of texts as in the Litkey Corpus, prompting a multimodal LLM with identical picture stories. Having both the Litkey and the LLM-generated text, we can now use corpus analysis for a detailed comparative analysis. As metrics, the study investigates, as a first step, lexical-level analyses, focusing on word frequency and lexical richness. The results indicate that although the LLM-generated corpus contains more tokens (LLM generated more words), the Litkey Corpus demonstrates greater lexical richness, suggesting that children's active vocabulary is more extensive. Word frequency investigations showed that both corpora follow natural language patterns (i.e., Zipf's law), indicated by few high-frequency words and many low-frequency ones. Also, we found a considerable correlation between the word frequency calculated from the corpora ( $r = 0.46$ ). We identified differences between corpora in the distribution of medium- and low-frequency words. The children used more words with high frequency than we found in the LLM corpus. The findings of this study suggest that while LLMs can, in part, describe pictures like children, significant limitations need to be addressed. New investigations should test systematic model parameter variations and different metrics to improve LLM-generated child corpora, thereby contributing to the creation of much-needed psycholinguistic resources.

**Keywords:** Large Language Models, corpus linguistics, word frequency measures, children's language

**Presentation type:** Original Research Talk

**Session:** From babies to semantics: Leveraging language models as tools for psycholinguistic research

---

## **Decoding Early Vocabulary Acquisition: Naturalistic evidence from EEG encoding models across the First Five Years**

Katharina Menn <sup>1, 2\*</sup>, Claudia Männel <sup>1, 3</sup>, Florian Scharf <sup>4</sup>, Hanna Woloszyn <sup>5</sup>, Benjamin Gagl <sup>5</sup>, Lars Meyer <sup>1, 6</sup>

<sup>1</sup> Max Planck Institute for Human Cognitive and Brain Sciences, Leipzig, Germany, <sup>2</sup> Tilburg University, the Netherlands, <sup>3</sup> Charité–Universitätsmedizin Berlin, Germany, <sup>4</sup> Universität Kassel, Germany, <sup>5</sup> Universität zu Köln, Germany, <sup>6</sup> University Hospital Münster, Germany

Infant language acquisition is marked by rapid learning, with comprehension of some basic words emerging within the first year of life. Measuring the earliest stages of lexical acquisition experimentally remains challenging. In this study, we assess the acquisition of lexical knowledge from electrophysiological (EEG) recordings of infants during natural language processing. Our dataset comprised a final sample of 51 children between 3 months to 5 years of age, assessed twice within a 3-month time window. Children heard stories in their native language (German) and an unfamiliar language (French). Electrophysiological responses to the individual words in the story were quantified using EEG encoding models. We observed native-specific electrophysiological responses to words, which increase with age ( $t = 2.34$ ,  $p = .021$ ). To estimate whether word onset responses are related to lexical processing, we employed LLMs (GPT-3.5) to generate age-appropriate text corpora and estimate lexical frequencies and contextual lexical predictabilities of the words in our stimuli. Amplitudes between 100–300 ms increase with word frequency ( $t = 3.14$ ,  $p < .001$ ), an effect attenuated by age ( $t = -2.22$ ,  $p = .026$ ). Amplitudes between 300–450 ms decrease with word frequency ( $t = -2.26$ ,  $p = .024$ ). Between 450–600 ms, amplitudes are modulated by age-appropriate lexical predictability ( $t = -4.88$ ,  $p < .001$ ). Thus, our findings reveal early electrophysiological sensitivity to individual words and words in context, suggesting that age-

appropriate LLMs may be a critical looking glass for studying the early emergence of language comprehension with non-invasive electrophysiological recordings.

**Keywords:**

**Presentation type:** Original Research Talk

**Session:** From babies to semantics: Leveraging language models as tools for psycholinguistic research

---

## Meaning Modulations and Stability in Large Language Models: An Analysis of BERT Embeddings for Psycholinguistic Research

Fritz Günther <sup>1\*</sup>, Federico Bianchi <sup>2</sup>, Giuseppe Attanasio <sup>3</sup>, Marco Marelli <sup>4</sup>, Giovanni Cassani <sup>5</sup>

<sup>1</sup> *Humboldt-Universität zu Berlin, Berlin, Germany*, <sup>2</sup> *Stanford University, Stanford, USA*, <sup>3</sup> *Instituto de Telecomunicações, Lisbon, Portugal*, <sup>4</sup> *University of Milano–Bicocca, Milan, Italy*, <sup>5</sup> *Tilburg University, Tilburg, The Netherlands*

Computational models of semantic representations have long assumed and produced a single static representation for each word type, ignoring the influence of linguistic context on semantic representations. Recent Large Language Models (LLMs) introduced in Natural Language Processing, however, learn token-level contextualized representations, holding promise to study how semantic representations change in different contexts. In this study, we probe type- and token-level representations learned using a prominent example of such models, Bidirectional Encoder Representations from Transformers (BERT), for their ability to i) explain semantic effects found for isolated words (semantic relatedness and similarity ratings, lexical decision, and semantic priming), but critically also to ii) exhibit systematic interactions between lexical semantics and context, and iii) explain meaning modulations in context. Across a wide range of empirical studies on each of these topics, we show that BERT representations satisfy two desiderata for psychologically valid semantic representations: i) they have a stable semantic core that allows people to interpret words in isolation and prevents words to be used arbitrarily and ii) they interact with sentence context in systematic ways, with representations shifting as a function of their semantic core and the context. This demonstrates that a single, comprehensive model which simultaneously learns abstract, type-level prototype representations as well as mechanisms of how these interact with context can explain both isolated word effects and context-dependent variations. Notably, these variations are not



limited to discrete word senses, eschewing a strict dichotomy between exemplar and prototype models and re-framing traditional notions of polysemy in semantic memory.

**Keywords:** Distributional semantics, Large Language Models, Computational Psycholinguistics, Mental lexicon, Context-dependent semantic representations, Ambiguity, Polysemy

**Presentation type:** Original Research Talk

**Session:** From babies to semantics: Leveraging language models as tools for psycholinguistic research

---

## A Systematic Evaluation of Dutch Large Language Models' Surprisal Estimates

Sam Boeve \*, Louisa Bogaerts

*Ghent University*

Studies using computational estimates of word predictability from neural language models have garnered strong evidence in favour of surprisal theory. Upon encountering a word, readers experience a processing difficulty that is a linear function of that word's surprisal. Evidence for this effect has been established in English or across languages using multilingual models. At the same time, many language-specific models of unknown psychometric quality are made openly available. Here, we provide a systematic evaluation of the surprisal estimates of a collection of large language models, specifically designed for Dutch, examining how well they account for reading times. We compare their performance to a multilingual model (mGPT) and an N-gram model. Across three eye-tracking corpora, a Dutch model predicted reading times better than the multilingual model. Dutch large language models replicate the general inverse scaling trend observed for English, with the surprisal estimates of smaller models showing a better fit to reading times than those of the largest models, yet, this effect depends partly on the corpus used to evaluate the model. In contrast to the linear effect of surprisal on reading times observed in other corpora, for the GECO corpus a non-linear link fitted the data best. Overall, these results offer a psychometric leaderboard of Dutch large language models and challenge the notion of a ubiquitous linear effect of surprisal. The complete set of surprisal estimates derived from all neural language models across the three corpora, along with the code to extract the surprisal, is made publicly available (<https://osf.io/wr4qf/>).

**Keywords:** reading, prediction, surprisal, eye movements, large language models, Dutch

**Presentation type:** Original Research Talk

**Session:** From babies to semantics: Leveraging language models as tools for psycholinguistic research

---

## The emergence of semantic and syntactic units in massive multi-language models

marco marelli \*, Andrea Gregor De Varda

*University of Milano-Bicocca*

Massively multilingual models, such as mBERT and XLM-R, can process text and provide representations for several languages relying on a shared set of parameters. Here, we discuss to what extent such systems can encode cross-lingual information in single network units. We present evidence in this respect for both syntactic phenomena, namely number agreement, and semantic properties, namely valence and arousal of words. We found that there is a significant overlap in the neurons that encode number agreement across five languages (English, German, French, Hebrew, Russian); common populations of neurons encoding for affective dimensions, on the other hand, were found for several languages. Such overlaps peak in the intermediate levels of the lexicon. This evidence suggests that symbol-like representations, at the levels of individual neurons, can naturally emerge in such multi-layer networks as a way to optimize learning.

**Keywords:**

**Presentation type:** Original Research Talk

**Session:** From babies to semantics: Leveraging language models as tools for psycholinguistic research

# MIND MEETS MACHINE: COGNITIVE INSIGHTS INTO HUMAN-AGENT INTERACTION

---

## Error monitoring and performance in human-AI teams

Jairo Perez-Osorio <sup>1\*</sup>, Sophia Marie Steindel <sup>1</sup>, Craig G. McDonald <sup>2</sup>, Eva Wiese <sup>1, 2</sup>

<sup>1</sup> TU Berlin, <sup>2</sup> George Mason University, Fairfax, USA

The rise of machine learning and generative AI has brought challenges, particularly around how individuals perceive and interact with these technologies. People often misalign their reliance on automation—either overtrusting poor systems or distrusting reliable ones—leading to overreliance or underuse. Automation biases also lead individuals to follow AI without checking its accuracy and high performance. Trust in automation is hard to measure, and neural correlates are emerging as promising tools. Event-related potentials (ERPs) like error-related negativity (ERN) and error positivity (Pe) reflect how people respond to errors, both their own and those of others. Participants collaborated (collected points together) or competed with an algorithm in an experiment using a modified Eriksen Flanker task. We measured the neural responses (oERN and oPe) of participants while performing the task and observing the algorithm performing the same task. During the algorithm monitoring, ERPs revealed that participants tracked algorithm errors in both groups. However, performance profiles differed, with shorter reaction times and fewer errors during the performance competition relative to the collaboration condition. Our results suggest that participants attended to the algorithm performance but performed differently depending on the social context. We conclude that collaborating and competing with artificial intelligence elicit brain activity and behavioral performance similar to those of interacting with humans.

**Keywords:** Human-AI interaction, Event-related potentials (ERPs), Error monitoring, Automation bias, Trust in automation

**Presentation type:** Original Research Talk

**Session:** Mind meets machine: Cognitive insights into human-agent interaction

## **Try to see it my way: When do humans take the visual perspective of robots?**

Leda Berio \*

*Ruhr University Bochum*

Visuospatial perspective-taking (VPT) is a fundamental process of social cognition. To date, few studies have investigated whether humans also take the perspective of humanoid robots. Recent findings are conflicting as one study found no evidence for level 1 VPT (i.e., which object is seen by the robot) and a different study found evidence for level 2 VPT (i.e., how the object is seen by the robot). The latter study proposed that the mere human-like appearance of robots triggers VPT (mere-appearance hypothesis). Here, we tested level 1 VPT for humanoid robots and the robustness of the mere-appearance hypothesis. We manipulated the human-like appearance of the robot and the robot's mental capacity to perceive its environment. We found that all manipulations triggered VPT, showing, in contrast to earlier findings, level 1 VPT for robots. Also, our findings support the mere-appearance hypothesis as VPT was triggered regardless of whether the robot had a mental capacity to perceive its environment or not. In four follow-up experiments, we assessed the boundary conditions of the mere-appearance hypothesis and found that VPT is triggered not only by human-like visual features but also by non-human-like features implying a human presence.

**Keywords:** Visual perspective taking, mere appearance hypothesis, design

**Presentation type:** Original Research Talk

**Session:** Mind meets machine: Cognitive insights into human-agent interaction

---

## **The role of sensory motor information on agency attribution in human-robot interaction**

Francesca Ciardo \*

*University of Milan-Bicocca*

In joint action, we succeed in “staying in-the-loop” thanks to sensorimotor synchronization (SMS), which allows us to develop internal models of both self-and other- actions, and to integrate these models in real-time. The present study aimed to evaluate whether and how SMS implemented on a humanoid robot can facilitate planned coordination and perception of shared agency in HRI. To this end, we developed a joint tapping task in which participants were asked to play a melody together with the humanoid iCub robot. Across different blocks, we manipulated the amount of temporal adaptation (reactive error correction) and anticipation (predictive processing) applied by the robot in relation to its human partner to resemble (or not) parameters of human behaviour. At the end of each block, participants rated the perceived shared agency with the robot. Results showed that better performance, i.e. lower mean asynchrony, and lower variability in asynchrony occurred when the robot acted based on human-like parameters of temporal adaptation and anticipation. In addition, shared agency ratings were affected by the human-likeness of the parameters applied to control iCub's behaviour. Together, our results suggest that endowing robots with temporal adaptation and anticipation mechanisms allows humans to successfully stay in-the-loop in HRI, in two different ways. Firstly, the need to constantly update our internal model of iCub to reduce the prediction error about its performance results in higher synchronization and more strength in coupling when the robot is run based on human-like parameters. Secondly, by increasing the perception of shared agency.

**Keywords:** Human-robot interaction, Joint action, Agency

**Presentation type:** Original Research Talk

**Session:** Mind meets machine: Cognitive insights into human-agent interaction

## When do humans offload an attentionally demanding task to an algorithm?

Basil Wahn \*

*Technische Universität Berlin*

In today's world, complex cognitive tasks formerly reserved for humans start becoming feasible for computer algorithms. Consequently, humans encounter increasingly more opportunities to offload a variety of tasks to such algorithms. The present studies investigate under which conditions people engage in this form of "cognitive offloading". Our findings demonstrate that people's willingness to offload an attentionally demanding task to a computer algorithm is influenced by their knowledge about the algorithm's capacity and by the possibility to engage in a bonus task. That is, people want to make sure that the offloaded work is performed well: they are more willing to offload if they have knowledge about the algorithm's reliability. Also, people want to avoid boredom and stay engaged: they are more willing to offload if they themselves have another task to perform – regardless of whether this task promises additional monetary reward.

**Keywords:** Cognitive offloading, Human–computer collaboration, Human–computer interaction, Social cognition, Algorithmic aversion, Algorithmic appreciation

**Presentation type:** Original Research Talk

**Session:** Mind meets machine: Cognitive insights into human-agent interaction

---

## Exploring Trust Dynamics in Human-Agent Teams

Amroté Getu <sup>1, 2\*</sup>, Eva Wiese <sup>1, 2</sup>

<sup>1</sup> *Technische Universität Berlin*, <sup>2</sup> *George Mason University*

Social robots and AI are increasingly valuable assets in various workplace settings, including healthcare, the service industry, and decision support systems. Understanding how trust differs between non-human and human teammates is crucial for creating effective and cohesive work environments. A key challenge is trust miscalibration, which involves the overreliance (misuse) on

less capable agents and the underreliance (disuse) on more capable ones. Notably, teams with multiple non-human agents often exhibit system-wide trust, where all agents are perceived as having equal capabilities, increasing the risk of miscalibrated trust. It is essential to evaluate team members based on their specific abilities, known as component-specific trust, regardless of the task or agent involved. The presented research aims to validate new metrics for trust in human-agent interactions in both online and lab environments by aligning perceptions with actual capabilities. In a series of studies, participants collaborate with one, two, or three teammates (human, robot, or AI), with varying capabilities, to identify target symbols among similar distractor symbols in a visual search task. We use behavioral measures (e.g., interventions to assist teammates) and physiological indicators (e.g., eye-tracking or mouse movements to monitor teammates) to establish more objective trust metrics. Our findings suggest that this paradigm effectively distinguishes trusting behaviors in both monitoring actions and interventions, serving as an initial step toward exploring trust in human-agent teams more effectively.

**Keywords:** Trust, Human-agent teams, Eye tracking, VR, Measures, HRI, Social Robots

**Presentation type:** Original Research Talk

**Session:** Mind meets machine: Cognitive insights into human-agent interaction

## STATISTICAL LEARNING AND ITS ROLE IN LANGUAGE AND READING ACQUISITION

---

### No Evidence for Bilingual Advantage in Statistical Word Learning

Matilde Ellen Simonetti <sup>1\*</sup>, Megan G Lorenz <sup>2</sup>, Iring Koch <sup>1</sup>, Tanja Roembke <sup>1</sup>

<sup>1</sup> RWTH Aachen University, <sup>2</sup> Augustana College

While a bilingual advantage is widely observed in some word learning paradigms, its existence in statistical word learning, where each word learning situation by itself is ambiguous, remains debated. Some research in this field suggests that bilinguals have a general advantage over monolinguals, while other studies show differences only under specific conditions or no differences

at all. Thus, as part of a registered report, our study investigated statistical word learning using the Cross-Situational Statistical Learning paradigm in two adult groups: English-German bilinguals and English monolinguals (overall N = 200). Participants learned single (1:1—one word maps onto one object) and multiple mappings (1:2—one word maps onto two objects). We predicted, consistent with the literature, that acquiring 1:1 than 1:2 mappings would be easier, and we confirmed this hypothesis. We also predicted that bilinguals would outperform monolinguals for 1:2 mappings, consistent with a specific bilingual advantage (i.e., bilinguals' higher familiarity with multiple mappings may result in a learning advantage for these mappings only). Contrary to our expectations, we found a general monolingual word learning advantage without any specificity for mapping types. Furthermore, we measured learning continuously and analysed trial-by-trial behaviour to understand fine-grained learning differences across language groups. Participants were indeed using their previous knowledge (of the target and foil objects) to inform their behaviour on a current trial; however, no differences in learning patterns emerged between groups. Overall, our findings challenge the assumption that bilingual advantages extend to statistical word learning, suggesting a monolingual advantage in this context instead.

**Keywords:**

**Presentation type:** Original Research Talk

**Session:** Statistical learning and its role in language and reading acquisition

---

## Orthographic knowledge in bilingual children

Lukas Hauser <sup>1\*</sup>, Karin Landerl <sup>1</sup>, Konstanze Edtstadler <sup>2</sup>, Anna Steiner <sup>2</sup>, Ferenc Kemeny <sup>1</sup>

<sup>1</sup> *Department of Psychology, University of Graz, Austria,* <sup>2</sup> *Department of Elementary and Primary Education, University College of Teacher Education Styria, Austria*

Understanding the regularities of letters and letter patterns in your own language is generally considered to be a supporting factor for reading development. This general orthographic knowledge (GOK) has been investigated by numerous studies in the past. It is not clear, however, what happens when bilingual children are exposed to two orthographies and thus two sources of input simultaneously.

GOK is assessed in bilingual children who speak and read in German as well as Croatian and German monolingual children via a letter detection task. Participants are asked to indicate whether



a presented bigram contains a target letter. Bigram frequency is orthogonally varied: high in both orthographies (high-high), high in German and low in Croatian (high-low), low in German and high in Croatian (low-high) or low in both orthographies (low-low). All bigrams consist only of consonants. Accuracy and reaction times are recorded. Additional measures include spelling and reading fluency. Data is collected from 4th Grade of elementary school (age 9-11 years), with a planned sample size of 80 children per group.

We expect a frequency effect in processing speed: High-frequency bigrams are processed faster than low-frequency bigrams – in all participants. We also expect this effect to be moderated by bilingualism: Processing speed of bigrams in the “high-low” and “low-high” conditions is faster than in the “low-low” condition, but slower than the “high-high” condition, as representations of both languages are activated. We also expect GOK to explain unique variance in reading performance of monolingual children and the dominant language of bilingual children.

**Keywords:** orthographic knowledge, bilingualism, reading development

**Presentation type:** Original Research Talk

**Session:** Statistical learning and its role in language and reading acquisition

---

## How is statistical learning related to reading ability? Examining potential mechanisms

Xenia Schmalz \*, Kristina Moll , Gerd Schulte-Körne

*Department of Child and Adolescent Psychiatry, Psychosomatics and Psychotherapy, LMU  
University Hospital, LMU Munich*

Reading unfamiliar words requires knowledge of regularities underlying the orthography. Here, we test a causal chain which aims to explain individual differences in reading ability. Reading aloud new words is likely to depend on the knowledge of higher-order regularities about the print-to-speech mapping (e.g., in English, that an ‚a‘ is pronounced /ɔ/ when it follows a ‚w‘). This, in turn, is likely to depend on the ability to extract such regularities. The ability to extract orthography-related regularities may be driven by statistical learning ability, which refers to the efficiency of a domain-general mechanism which extracts regularities. We test the plausibility of this causal chain with a correlational design, with 60 adult participants. If such a relationship holds, we expect to find support for the presence of correlations (1) between

pseudoword reading ability and use of implicitly learned print-to-speech regularities in a different pseudoword reading aloud task, (2) between the use of such implicitly learned regularities and the ability to extract them from a novel, artificial orthography, and (3) between the ability to extract novel orthography-related regularities and domain-general statistical learning ability. We find partial evidence for the pre-registered causal chain.

**Keywords:**

**Presentation type:** Original Research Talk

**Session:** Statistical learning and its role in language and reading acquisition

---

## **Busting the myth again: No positive correlations between individuals' sensitivity to bigram frequency and their reading ability**

Haoyu Zhou <sup>1\*</sup>, Fabienne Chetail <sup>2</sup>, Louisa Bogaerts <sup>1</sup>

<sup>1</sup> *Department of Experimental Psychology, Ghent University*, <sup>2</sup> *Laboratory of Cognition, Language, and Development, Université Libre de Bruxelles*

Our language environment is rich in regular patterns. It is therefore natural to assume that statistical learning—the ability to implicitly extract regularities from sensory input—plays a role in processing written text and contributes to more efficient reading. Given the moderate correlations between statistical learning performance and reading abilities found in the literature, we hypothesize that this relationship is mediated by individuals' sensitivity to orthographic regularities, such as frequent bigrams. Importantly, previous studies confounded sensitivity to bigram frequency with bigram legality and evaluations of reliability are lacking. In this presentation, I will discuss recent findings from multiple behavioral tasks designed to tap sensitivity to bigram frequency in adult Dutch and French speakers. These findings point to moderate reliability and consistently show near-zero or even negative correlations between sensitivity measures and reading abilities, suggesting that individual differences in bigram-level statistical learning do not contribute to reading abilities.

**Keywords:** Statistical learning; Reading; Individual differences; Bigram frequency

**Presentation type:** Original Research Talk

**Session:** Statistical learning and its role in language and reading acquisition

## Speech segmentation in German-learning infants: the weight of statistical and prosodic cues

Mireia Marimon <sup>1\*</sup>, Alan Langus <sup>2</sup>, Barbara Höhle <sup>2</sup>

<sup>1</sup> *Center for Brain and Cognition, Pompeu Fabra University, Spain*, <sup>2</sup> *Department of Linguistics, University of Potsdam, Germany*

Speech segmentation is one of the first tasks infants face when learning their mother tongue. On the one hand, it has been argued that statistical learning could function as a gateway to speech segmentation in the absence of pre-existing knowledge about the language to be acquired. Initial support for this hypothesis came from corpus analyses that showed that Transitional Probabilities (TPs) tend to be higher within words than at word boundaries, and that infants can segment continuous streams of stimuli in various perceptual domains by calculating TPs (Saffran et al., 1996). On the other hand, infants could also segment speech with prosodic cues, such as lexical stress, phrasal prominence and intonational contours which they are sensitive to during the first months of life, if not already at birth (e.g., Johnson & Jusczyk, 2001). Here we present evidence about how infants weigh statistical and prosodic information when segmenting continuous speech. We argue that the dominant idea that infants discover their native language prosodic structures through statistical regularities (Thiessen & Saffran, 2003), as has been evidenced in English- and French-learning infants, is not found with German-learning infants. With more natural speech stimuli, infants only become sensitive to statistical regularities in the speech signal by their first birthday (Marimon et al., 2022; 2024).

**Keywords:** statistical learning; transitional probabilities; prosody; language acquisition

**Presentation type:** Original Research Talk

**Session:** Statistical learning and its role in language and reading acquisition

# FROM BERRIES TO BRAINS: INSIGHTS INTO SEARCH BEHAVIOR

## FROM VISUAL FORAGING – PART I: SPATIAL & FEATURE-BASED ATTENTION

---

### **Target emotional valence and participants' trait anxiety shape visual foraging patterns**

Jérôme Tagu \*, Christelle Robert , Stéphanie Mathey

*University of Bordeaux, LabPsy, Bordeaux, France*

A critical question in visual foraging concerns the factors driving target selection. Previous work suggests that target selection is achieved through competition between different factors (e.g., proximity, priming) that orient attention towards one of the possible targets. However, this research has mainly involved simple stimuli such as colored dots. In single-target visual search, emotional stimuli (e.g., pictures, faces) with positive or negative valence have been shown to capture attention over neutral stimuli. In the current study, we designed a visual-foraging task involving real-world photographs eliciting negative, neutral or positive emotions as stimuli. The 75 observers completed three foraging tasks corresponding to three emotional-valence conditions: in the positive, neutral, and negative blocks, participants had to select pre-specified images eliciting respectively positive, neutral and negative emotion, among neutral distractors. In each block, there were always two target types and two distractor types, and the task was to select all the targets as fast as possible, while ignoring the distractors. We measured observers' foraging strategy (i.e., selection order, number of switches between target types) and performance (i.e., selection times, number of distractor selections). Additionally, we assessed participants' trait-anxiety to examine how it could modulate the influence of emotional valence on foraging behavior. The results reveal that negative emotional valence influences both foraging strategy and performance, and suggest that these effects are modulated by participants' trait-anxiety. These findings importantly show that emotional processing contributes to target selection during foraging and highlight the need for using ecologically-valid stimuli in visual-foraging research.

**Keywords:** Visual foraging, Attention, Emotion, Target selection, Trait anxiety

**Presentation type:** Original Research Talk

**Session:** From berries to brains: Insights into search behavior from visual foraging – Part I: Spatial & feature-based attention

---

## Tracing a spiral: Foraging organization in weakly structured environments

Jan Tünnermann \*, Mia Raab , Anna Schubö

*Philipps-Universität Marburg*

Visual foraging tasks, used to assess selective attention and search behavior, typically involve participants collecting target items from randomized arrays of targets and distractors on tablets or PC screens. While participants often optimize search paths based on various factors (attentional constraints, value, etc.), they also exhibit tendencies toward systematic search patterns (e.g., row or column-based) even through random arrangements. However, the real world is rarely random. For instance, when picking berries from a bush, one might follow the direction of a branch rather than scanning the bush in a reading direction. In this study, we examined how spatial foraging organization adapts to the presence of structure in the environment. We designed search arrays where targets and distractors were arranged in patterns that introduced weak structure, without requiring participants to utilize these patterns to locate targets. Nevertheless, our results indicate that participants adapted their spatial search strategies to these subtle environmental structures. We introduce novel metrics to quantify the extent of this adaptation, providing new insights into how weak structures in the environment influence visual search organization. These findings highlight the adaptive nature of human foraging behavior in response to environmental regularities.

**Keywords:** visual foraging, visual search, visual attention

**Presentation type:** Original Research Talk

**Session:** From berries to brains: Insights into search behavior from visual foraging – Part I: Spatial & feature-based attention

## Exploring the nature of inhibitory tagging in the MILO task.

Ian M. Thornton \*

*Department of Cognitive Science, University of Malta*

The Multi-Item Localization (MILO) task is a variant of visual search in which participants have to select multiple target items in a pre-defined order. While MILO has much in common with other visual foraging tasks, the use of a sequence adds the ability to precisely explore within-trial temporal context. Here I will focus on retrospective within-trial context, the influence that previously selected items have on search for the current target. A very robust finding is that reaction time patterns are almost identical for trials in which items vanish when selected and trials in which previously selected items remain visible. This suggests we can effectively ignore old targets, probably via some form of inhibitory tagging.

In the current presentation, the results of two ongoing studies will be reported. The first project asks whether there is a limit to the number of items that can be tagged. Previous MILO studies have used sequence lengths between 6 and 12 items. Do the RT functions for vanish and remain trials continue to overlap with 18, 24 or 36 items, for example? The second project asks whether inhibitory tagging relies on motor commands directed to a specific location, for example touch responses or mouse clicks. What happens to vanish/remain patterns when items are selected indirectly? This can be explored using keyboard mappings to secondary characteristics – such as randomly varying color or Landolt C orientation – that can be assigned to objects independent of their position within a sequence.

**Keywords:** Visual Search, Foraging, Inhibitory Tagging, MILO Task

**Presentation type:** Original Research Talk

**Session:** From berries to brains: Insights into search behavior from visual foraging – Part I: Spatial & feature-based attention

## **Gaze-based foraging: Eyes as input and as insight**

Marian Sauter \*

*General Psychology, Ulm University*

Foraging is a behavior that involves not only visual search but also the actions necessary to interact with and manipulate the environment. It requires the integration of perception and action, making it an ideal model for studying how attention and behavior are coordinated. This talk will present two complementary perspectives on eye-based foraging tasks. The first perspective examines the use of gaze as an input mechanism for interacting with the environment during real-time search tasks, highlighting how observers sample information in such settings. The second perspective focuses on recording eye movements during foraging tasks, investigating the relationship between visual attention and manual actions. By analyzing the coordination between where we look and how we act, these perspectives offer a richer understanding of the interplay between attention and action. Together, this provides insights for understanding real-world tasks, where efficient visual search and action are essential for success in everyday activities.

**Keywords:** visual search, visual foraging, gaze, eye tracking

**Presentation type:** Original Research Talk

**Session:** From berries to brains: Insights into search behavior from visual foraging – Part I: Spatial & feature-based attention

---

## **New directions for FoMo: Modelling spatial biases in visual foraging**

Alasdair Clarke \*, Manjiri Bhat , Anna Hughes

*Department of Psychology, University of Essex*

One of the attractions of the visual foraging paradigm is the rich data that is produced by participants. Each trial produces a sequence of item-selections, and these sequences are influenced by features (i.e., colour, shape) and spatial factors such as how far away potential targets are from the previously selected item. While this complexity allows us to study the interaction of visual perception and decision-making, it can also complicate the analysis. Clarke et al (2022, PloS Comp Bio) introduced a four parameter generative model for visual foraging

(FoMo) that aims to predict which item a participant will select next. In this talk, I will present a new foraging experiment that explores how the layout of the foraging items influences the spatial strategies that participants use while foraging. We find that when items are placed on a cardinal grid, the foraging sequences generally follow the grid orientation. Rotating the grid to an oblique orientation leads to a preference for the oblique directions. However, the overall direction bias is stronger when the grid has a cardinal direction, suggesting that participants have an underlying preference for cardinal directions above and beyond what is present in the stimulus. We develop a von Mises mixture model to account for these patterns of inter-item target selections. Finally, we incorporate this as a new component in FoMo and discuss the effect this has on the accuracy of our predictions.

**Keywords:** visual foraging, computational modelling, visual search

**Presentation type:** Original Research Talk

**Session:** From berries to brains: Insights into search behavior from visual foraging – Part I: Spatial & feature-based attention

## FROM BERRIES TO BRAINS: INSIGHTS INTO SEARCH BEHAVIOR FROM VISUAL FORAGING – PART II: STRATEGY & DECISION MAKING

---

### Adult age differences in visual foraging

Marianna Pope <sup>1, 2\*</sup>, Iris Wiegand <sup>1, 2</sup>

<sup>1</sup> Donders Centre for Cognition, Donders Institute, <sup>2</sup> Department of Neuropsychology and Rehabilitation Psychology, Radboud University

Older adults may experience difficulties in a variety of real-world visual search tasks, which potentially result from multiple cognitive processes affected by aging, such as decline in selective attention, memory failure, or changes in explore-exploit decisions. Experimental visual foraging and



“hybrid” visual and memory foraging tasks, in which participants search for several instances of one or multiple target objects across many search environments, allow us to systematically investigate which task factors and cognitive processes contribute to age differences in complex search tasks. In this talk, we will review our recent work on (hybrid) foraging in younger and older adults. Besides the consistent finding of age-related slowing in foraging tasks, our results demonstrate that age differences in the efficiency of visual search, memory search, and explore-exploit decisions are specific to the cognitive requirements of the tasks. Overall, older adults appear to adapt their search behavior according to the demands of the foraging task, presumably to compensate for age-related decline in cognitive resources. Furthermore, we explored how foraging behavior is influenced also by other individual differences than age, such as trait curiosity and cognitive reserve.

**Keywords:** visual foraging, aging research

**Presentation type:** Original Research Talk

**Session:** From berries to brains: Insights into search behavior from visual foraging – Part II: Strategy & decision making

---

## Past, present and future in the study of experimental foraging in children

Beatriz Gil-Gómez de Liaño \*

*Autonomous University of Madrid*

As a more complex version of visual search, in Foraging and Hybrid Foraging (HF), observers search for multiple exemplars of multiple targets (e.g. look for yellow and purple perler-beads in the handicrafts box). In this talk, I will review what we know about foraging in children so far: How children search in foraging and HF tasks using different types of stimuli, in exhaustive and non-exhaustive foraging, under various conditions of memory modulations, or how they organize their search at diverse moments in development. We will also pay special attention to flexibility and decision-making in quitting rules in foraging in children, as well as differences between typically developing children and atypical developmental individuals (specifically, children diagnosed with ADHD). We will also show our FORAGEKID game as a valuable tool for understanding the development of executive function in foraging tasks and the potential use in the future of experimental and applied neuropsychological sciences.

**Keywords:** Hybrid Foraging, children, visual search, ADHD

**Presentation type:** Original Research Talk

**Session:** From berries to brains: Insights into search behavior from visual foraging – Part II:  
Strategy & decision making

---

## The marginal value theorem (usually) tells you when it is time to move to the next patch.

Jeremy Wolfe <sup>1, 2\*</sup>, Injae Hong <sup>1, 2</sup>

<sup>1</sup> Brigham and Women's Hospital, Boston, MA USA, <sup>2</sup> Harvard Medical School, Boston, MA USA

If you are picking berries in a field of berry patches, when is it time to move to the next patch? One obvious thought is that you should pick every ripe berry, but collecting the last berries might be more trouble than it is worth. Instead, Charnov's (1976) "Marginal Value Theorem" (MVT) argues that the optimal time to leave comes when the current rate of return drops below the overall average rate of return. MVT successfully describes human behavior in basic human foraging tasks in the lab. For instance, if the "travel time" between berry patches is made longer, foragers will tend to stay longer in the current patch because the unprofitable travel time drives down the overall rate of return. However, there are limits to MVT. Some are obvious. If there is pressure to collect every target (e.g. in some medical settings), MVT would be the wrong definition of 'optimal'. Others are less obvious. How should we understand foraging for rare targets where the current rate of return may drop to zero for extended periods but where we would not want the forager to give up on the patch? We will present examples of the power and limits of the MVT approach to human foraging.

**Keywords:** foraging, visual search, marginal value theorem, visual perception, visual cognition

**Presentation type:** Original Research Talk

**Session:** From berries to brains: Insights into search behavior from visual foraging – Part II:  
Strategy & decision making

## Angles, circles, and quitting rules in visual foraging

Marcos Bella-Fernández <sup>1, 2, 3\*</sup>, Manuel Suero Suñé <sup>3</sup>, Beatriz Gil-Gómez de Liaño <sup>3</sup>

<sup>1</sup> UNIE Universidad, <sup>2</sup> Universidad Pontificia de Comillas, <sup>3</sup> Universidad Autónoma de Madrid

Foraging is a variant of the classical visual search paradigm where the observer collects targets in a display rich in both targets and distractors. Visuospatial organization is a characteristic of foraging behavior which is receiving increasing attention in foraging research. On one side, organization may help to predict the decision of leaving a certain search. Consolidated evidence shows that observers tend to leave roughly after the instantaneous target intake rate drops below the average intake rate. However, this alone does not necessarily mean that the intake rates are predictors of quitting behavior, and recent evidence suggests that visuospatial search organization may serve as a better predictor of the leaving decision. Moreover, studying angles and trajectories may be useful to further study search organization. In this talk I present new methods to study visual scanning and search organization through the trajectory angles and circular data analysis.

**Keywords:** Visual Foraging, Quitting Decision, ROC Curves, Angles, Circular statistics

**Presentation type:** Original Research Talk

**Session:** From berries to brains: Insights into search behavior from visual foraging – Part II: Strategy & decision making

---

## Modelling foraging as an evolving sequence of decisions

Joe MacInnes <sup>1\*</sup>, Sofia Tkhan Tin Le <sup>2</sup>, Árni Kristjánsson <sup>2</sup>

<sup>1</sup> Swansea University, department of Computer Science, <sup>2</sup> University of Iceland

Foraging is a complex visual task comprising a mixed array of target and distractor stimuli. Similar to visual search, targets may be distinguished by a single feature or by a conjunction of features. Unlike visual search, foraging arrays contain many targets of multiple types and participants are instructed to select all targets in whatever order they choose. These multiple selections for each trial/array allow for rich analysis of selection sequences and runs that aren't often possible with other visual tasks. These sequences can also be viewed as a series of individual decisions that are influenced by top-down strategies, bottom up scene features and potentially history of the previous

selections. This presentation will show new experimental data and a computational model that tries to break down the critical task features that influence those individual decisions. The experiment data comes from a new 'snapshot' foraging task that restricts each foraging selection to its local area to control for global scene statistics. The computational model uses a Bayesian approximation to the Theory of Visual Attention to determine the features that are important for selection in feature and conjunction foraging. Combined, we hope to provide an improved understanding of how attention is allocated in this complex task by treating it as an evolving sequence of selections

**Keywords:** Foraging, Model, Bayesian, TVA

**Presentation type:** Original Research Talk

**Session:** From berries to brains: Insights into search behavior from visual foraging – Part II: Strategy & decision making

## THE FUTURE OF TVA – PART 1: COGNITIVE PROCESSES

---

### From Attention to Awareness: Exploring Template Tuning as the Basis for Consciousness

Thomas Alrik Sørensen \*

*Aalborg University*

The Theory of Visual Attention (TVA; Bundesen, 1990) describes how attention operates through the combined processes of object selection and categorization. This is crucial for systems with severe capacity limitations, such as working memory. This limitation is in stark contrast to how people experience the environment. While TVA does not directly address awareness, Bundesen and Habekost (2008) have related TVA to Block's (1995) distinction between access and phenomenal awareness. Access consciousness (A-consciousness) is equated with visual short-term memory, while phenomenal consciousness (P-consciousness) corresponds to iconic memory—a fleeting experience of seeing more than we can access. Nevertheless, TVA does not account for a range of phenomena related to awareness, such as gist perception (e.g., Potter,

1976), and it remains unclear how history effects, such as serial dependence (e.g., Fisher & Whitney, 2014), influence categorization.

Recently, we have proposed that the template-matching procedure in TVA may play a key role in understanding human awareness, coining this approach as the Template Tuning Theory (Brogaard & Sørensen, 2023a). While phenomena such as serial dependence may eventually be incorporated into TVA's bias parameter, expertise-related modulations, as demonstrated by Sørensen and Kyllingsbæk (2012), likely align more closely with changes in the template-matching process and the eta parameter. We suggest that template matching is driven by minimizing the prediction error between mental templates and sensory signals (Brogaard & Sørensen, 2023b). Additionally, templates need to be dynamic in nature, adapting and integrating new information, which in turn alters the experiential quality—or qualia—of the observer (Brogaard & Sørensen, 2024).

**Keywords:** Theory of Visual Attention, TVA, Awareness, Consciousness, Templates, Expertise, Perception

**Presentation type:** Original Research Talk

**Session:** The future of TVA – Part 1: Cognitive processes

---

## Priority control of vision: Filtering and pigeonholing revisited

Christian H. Poth \*, Werner X. Schneider

*Neuro-Cognitive Psychology, Bielefeld University*

Bundesen's (1990) Theory of Visual Attention (TVA) proposes two attention mechanisms that govern conscious visual perception: Filtering (selection of objects in space) and pigeonholing (selection of visual features). In TVA, the selection of features refers to the specification of response categories (e.g. a feature that is to be reported). Here, we review the relationship between filtering and pigeonholing and discuss the refinements that have been made to them in the past. On this basis, we present new ideas of how filtering and pigeonholing determine conscious visual perception. Last, we provide a roadmap of questions about possible mechanistic relationships of these two attentional mechanisms, and about how we can specify pigeonholing and filtering in more detail that should be addressed in future research.

**Keywords:** attention, visual perception

**Presentation type:** Original Research Talk

**Session:** The future of TVA – Part 1: Cognitive processes

---

## Experience-driven modulation of visual attention

Nir Shalev \*

*Department of Gerontology, University of Haifa, IL, The Institute of Information Processing and Decision Making, University of Haifa, IL*

The Theory of Visual Attention (TVA) is a computational model widely used to describe the various cognitive factors that contribute to the attentional selection of objects in the visual field. In TVA these factors are reflected in mathematical parameters that can be extracted by fitting empirical data into a set of equations.

Traditional works with the TVA model emphasised the influence of the observer's goals in biasing sensory signals. More recent developments in TVA have also considered the influence of the physical salience of objects in the visual field on the parameters governing attentional selection. As a result, TVA can now account for two main "drivers" of attentional guidance: goal-driven and stimulus-driven. However, many theoretical advancements suggest that attentional guidance cannot be fully understood without considering other factors related to learning and experience. For example, attention can be biased by our recent and long-term experiences with object locations, identities, reward value, and timing, regardless of our current goals or the physical properties of the stimuli.

In my talk, I will explore what we know about the experience-driven modulation of TVA parameters. I will present my work and discuss the work of others on how temporal expectations modulate visual processing speed. I will also present evidence on how spatial weights can shift in response to changes in the spatial probabilities of goal-relevant information. I will propose that future developments in TVA should consider incorporating the independent contributions of memory-related biases as distinct parameters aligning with contemporary perspectives on visual attention.

**Keywords:** Visual Attention, Temporal Attention, Perception, Processing Speed, Theory of Visual Attention

**Presentation type:** Original Research Talk

**Session:** The future of TVA – Part 1: Cognitive processes

## **Parametric TVA approach in aging research: Assessment and intervention**

Kathrin Finke \*

*Jena University Hospital, Neurology Department*

As the Theory of Visual Attention (TVA) continues to provide a rigorous, quantitative framework for understanding attentional processes, the future of its applications in psychology remains a pivotal area of exploration. This symposium – part of a double symposium on the future of TVA – assembles a series of talks that focus on new and important questions concerning the network of processes that TVA addresses. As a start, Schneider and Poth revisit one of TVA's core mechanisms, filtering and “pigeonholing” of incoming visual information, reconceptualizing it for the future. Shalev discusses TVA processes within the network of other cognitive mechanisms. He examines how recent and long-term experiences with object locations, identities, reward value, and timing interact with attentional resource allocation. Starting from the observation that TVA does not account for a range of phenomena related to awareness Sørensen closes this gap by exploring template tuning as a basis for conscious perception and thus offering a TVA-based perspective on the relationship between attention and awareness. Finke focuses on the area of aging by discussing TVA-based assessments and interventions in aging, focusing on TVA's future role in clinical research and on how TVA might help development of an integrative framework for understanding neurocognitive changes related with aging and developing strategies to preserve cognitive health in an ageing population.

**Keywords:** TVA, aging, neurodegeneration, subjective cognitive decline, cognitive training, physical exercises

**Presentation type:** Original Research Talk

**Session:** The future of TVA – Part 1: Cognitive processes

## THE FUTURE OF TVA – PART 2: MODELING

---

### Is The Future of TVA Bayesian?

Maximilian Rabe <sup>1, 2\*</sup>, Søren Kyllingsbæk <sup>1</sup>

<sup>1</sup> *Department of Psychology, University of Copenhagen*, <sup>2</sup> *Department of Psychology, University of Potsdam*

The Theory of Visual Attention (TVA) is widely employed in both fundamental and clinical research to model attention processes and assess individual differences in attentional capacity. Given its importance, the availability of reliable and user-friendly software packages is essential for advancing TVA-based research. Among the most widely used tools for fitting TVA parameters to experimental partial and whole report data are WinTVA (Kyllingsbæk, 2005) and LibTVA (Dyrholm et al., 2011). Both are likelihood-based, platform-dependent, may require third-party software licenses, and have yet to incorporate Bayesian and/or hierarchical parameter inference. We introduce RStanTVA, a novel implementation of TVA for partial and whole report, programmed in Stan and R. This software addresses the limitations of its predecessors. Additionally, parameters can now be specified using the well-established multilevel formula syntax in R. The package enhances the flexibility and accessibility of TVA modeling by streamlining model generation, fitting, and analysis within a Bayesian framework. We replicate a range of previously published experimental findings and demonstrate the advantages of Bayesian parameter inference for TVA models, such as Bayesian hierarchical parameter inference for partial and whole report. We also discuss how a Bayesian version of TVA can drive future advancements in attention research.

**Keywords:** Bayesian statistics, parameter inference, Stan, R, TVA, individual differences, hierarchical modeling

**Presentation type:** Original Research Talk

**Session:** The future of TVA – Part 2: Modeling

---



## Disentangling Phasic and Tonic Alerting: Independent Effects on Visual Attention

Dawa Dupont \*, Anders Petersen , Signe Vangkilde

*Center for Visual Cognition, Department of Psychology, University of Copenhagen*

Alertness is essential for sensory processing and efficient responses to environmental changes. While phasic alerting (transient, cue-driven) is known to enhance visual attention, its interaction with tonic alerting (sustained, baseline-reflecting) remains underexplored. In two preregistered experiments, we isolated the effects of phasic and tonic auditory alerting on visual attention using a novel phasic/tonic/no-alerting design and a purely accuracy-based letter recognition task. Computational modeling based on the Theory of Visual Attention (TVA) revealed that phasic alerting significantly enhances visual processing speed without impacting perceptual thresholds, visual short-term memory, or attentional selectivity. Notably, phasic alerting occurred independently of tonic alerting, providing a robust methodological framework for isolating these effects. These findings advance our understanding of the distinct roles of phasic alerting in accelerating early perceptual processing and highlight their implications for attentional dynamics in complex environments. In the final discussion, we will link the approach employed here to recent advances in TVA-based modeling of perceptual effects.

**Keywords:** Alertness, Attention, Theory of Visual Attention, Modeling, Tonic/Phasic, Perceptual Processing

**Presentation type:** Original Research Talk

**Session:** The future of TVA – Part 2: Modeling

## One Step Forward - Do TVA Estimates Generalize Across Experimental Paradigms

Kai Biermeier <sup>\*</sup>, Ingrid Scharlau

*Paderborn University*

The Theory of Visual Attention (TVA) provides a well-defined stochastic framework for understanding how attention is allocated in different tasks. An implicit assumption of TVA is that the parameters describing attention remain related across tasks, at least if the conditions are comparable (i.e. stimuli share the same color, eccentricity, etc.). Under these assumptions, TVA offers an interesting tool for studying the reproducibility of attention effects. Here, we focus on the reproducibility of the mean total processing capacity from the Temporal Order Judgment task - a comparably new experimental paradigm to estimate TVA parameters - to the Whole Report task - a well-established standard task.

For the analysis, we developed a Bayesian Model that implements a "traditional-K"-like likelihood for the Whole Report task and the TVA/TOJ likelihood for the Temporal Order Judgment task. We decided on a "traditional-K"-like likelihood for the Whole Report task because it has a compact form that fits well in the Bayesian framework.

The posterior distributions of the mean processing capacity assessed via a well-powered within-subjects experiment overlap. However, we cannot conclude with sufficient confidence that they are equal as there is still much variance within the parameters, leaving differences of medium to large size possible. The talk will discuss different theoretical and modeling-related explanations for this result.

**Keywords:** TVA, Bayesian Inference, Experimental Paradigms, Comparison

**Presentation type:** Original Research Talk

**Session:** The future of TVA – Part 2: Modeling

---

## Computational Modeling of Multitasking Performance Using a TVA Framework

Yannik Hilla <sup>1, 2\*</sup>, Vianne Demirel <sup>3</sup>, Paul Sauseng <sup>1</sup>, Wolfgang Mack <sup>2</sup>

<sup>1</sup> University of Zurich, <sup>2</sup> University of the Bundeswehr Munich, <sup>3</sup> Ludwig-Maximilians-Universität Munich

Performance is often impaired when at least two tasks are executed simultaneously. This constitutes an issue because many everyday tasks, e.g., cooking and driving, require conducting several subtasks in parallel. This raises the question of whether it is possible to explain and prevent this effect. The underlying mechanism thereof is hotly debated: e.g., (cognitive) capacity limitations, an increased demand for cognitive control, or impaired cognitive processing are discussed as constraints of multitasking. Hereby, multitasking performance has been traditionally operationalized based on difference scores between single- and multi-task condition performance measures or performance in multitasking conditions only. However, these approaches do not provide an algorithmic solution to multitasking and therefore provide little information as to how multitasking decrements emerge. Computational modeling constitutes a powerful solution to this issue. We used and extended a computational modeling framework based on the theory of visual attention by Bayesian asymmetrical distribution and mixture modeling to explain how performance declines in dual- and triple-task conditions as a function of sensory cognitive load. For this, we assessed and analyzed math, auditory discrimination, and working memory performance measures in single- and multi-task conditions of 60 individuals. By comparing the outcomes of a traditional and our approach of analyzing these performance measures, we demonstrate that in addition to replicating established multitasking performance effects our approach also allows to pinpoint how multitasking decrements emerge: e.g., we show that modality-specific cognitive overload impairs information processing only in some individuals, which may explain inconsistent results regarding cognitive capacity limitations in the literature.

**Keywords:** Attention, Cognitive Capacity, Bayesian Statistics

**Presentation type:** Original Research Talk

**Session:** The future of TVA – Part 2: Modeling

# DECODING HAND GESTURES: INSIGHTS INTO MEANING AND COMMUNICATION

---

## Using a new dataset of naturalistic hand gestures to investigate ideational units

Laura Hensel <sup>1\*</sup>, Stephanie Cheng <sup>1</sup>, Stacy Marsella <sup>1,2</sup>

<sup>1</sup> *University of Glasgow*, <sup>2</sup> *Northeastern University*

Hand gestures are a fundamental component of human communication (e.g., Clough & DuS, 2020; Kendon, 1997), yet their inherent complexity presents significant challenges for study. In this talk, I present a dataset comprising 2,372 annotated gestures, designed to facilitate in-depth analysis of human communication. We captured these gestures from nine speakers across three distinct categories: lecturers, politicians, and psychotherapists. The annotations encompass various aspects, including gesture types (e.g., metaphoric, iconic), descriptive terms characterizing each gesture (e.g., "sweep," "container"), and their corresponding verbal utterances. Additionally, the dataset provides detailed insights into physical properties such as distance from the body, hand configuration, and palm orientation. Importantly, we identified 97 new gestures (i.e., descriptive terms) not previously described in the literature.

I will demonstrate how this dataset supports the investigation of complex gestural phenomena, using the concept of ideational units as an illustrative example. Ideational units refer to gestural sequences that are cohesively linked through physical representations of the same or related concepts (Calbris, 2011). Within the dataset, we identified 435 such gestural sequences and conducted an analysis of their structures and patterns to explore how they convey meaning. Furthermore, I will discuss the implications of these findings for both theoretical frameworks and practical applications within gesture research, highlighting the potential contributions of this dataset to advancements in the fields of psychology and social robotics. Ultimately, this work underscores the role of gestures in enriching communication and provides insights into the intricate interplay between gesture and speech.

**Keywords:** Hand gestures, dataset, metaphoric gestures, ideational units

**Presentation type:** Original Research Talk

**Session:** Decoding hand gestures: Insights into meaning and communication

---

## From “affiliated” to “co-expressive” meaning in hand gestures

Schuyler Laparle \*

*Tilburg University*

Co-speech hand gestures have largely been assigned a supportive role, ‘enriching’ (Ebert 2024) the primary meaning that is conveyed in speech. As such, the meaning of the gesture itself is often considered too vague to be independently interpretable (McNeill 2005). Instead, one looks to accompanying speech and identifies the primary meaning with which the gesture is ‘affiliated’ (Schegloff 1984). For example, a gesture performed by rotating a hand in small circles, flexing at the wrist, may be interpreted as a “mixing” gesture if it accompanies a spoken description of mixing. I argue that this treatment conflates a gesture’s contextualized function with its inherent meaning (Bavelas 1994), thus inhibiting advancements in our understanding of how gestural meaning actually works.

As an alternative, I take a broadly ‘schematic’ approach, understanding gesture as meaning the action or image it resembles (Cienki 2013; Müller 2017). The contextualized function of a gesture is then determined by how it is incorporated into the utterance (Lascarides & Stone 2009; Parrill & Sweetser 2004). I look specifically at gestures for which a clear affiliate in speech can be identified, and explore how our perception of the gesture’s meaning and function changes when we first conduct a schematic analysis of the gesture itself. This work shifts our notion of gesture as being affiliated with (and dependent on) speech, to being co-expressive with it. As such, building models of gesture meaning in particular become an indispensable part of building multimodal models of linguistic meaning more broadly.

**Keywords:** gesture, multimodality, meaning-making, theory building

**Presentation type:** Original Research Talk

**Session:** Decoding hand gestures: Insights into meaning and communication

## Engineering Human Gestures

Stacy Marsella \*

*Northeastern University, University of Glasgow*

Modeling natural, meaningful gestures in embodied virtual agents is crucial for achieving human-like effective interactions between humans and agents. This talk delves into the challenges of computationally modeling gestures for virtual agents, with a particular focus on how models can effectively capture the intricate relationship between gesture and meaning. Gestures are imbued with communicative intent, emotional expression, and context-specific meaning. To develop virtual agents that are socially expressive and contextually appropriate, it is essential to create models that reflect this complexity.

Drawing from interdisciplinary research in psychology, linguistics, and computer science, this talk will explore how gesture can be modeled to convey meaning and intention. By leveraging computational techniques, the talk will showcase how gestures can be dynamically generated based on an agent's communicative intent and emotional states. Additionally, we will discuss the challenges in modeling not only individual gestures but also their coordination with verbal communication and the broader social context.

Recent advances in gesture modeling for virtual agents will be presented, illustrating how these systems can be used to simulate human behavior, as well as study psychological phenomena in controlled environments. This modeling not only improves the realism and effectiveness of virtual agents but also contributes to a deeper understanding of how gestures function in human communication, enabling insights into the cognitive and social processes underlying gesture production.

**Keywords:** Gestures, Computational Models, Embodied Virtual Agents

**Presentation type:** Original Research Talk

**Session:** Decoding hand gestures: Insights into meaning and communication

## **Kin cognition and communication: insights into the way people think and communicate about complex family structures**

Simon Devylder \*

*CNRS, Université Lumière Lyon 2*

I will present a study that explores how people use speech, gestures, and drawings to describe kinship systems, focusing on whether these multimodal representations reveal consistent patterns tied to social structures. Specifically, it examines the Paamese people of Vanuatu, a relatively understudied community in cognitive science. In semi-structured interviews, 40 Paamese speakers discussed their families, using both gestures and drawings to complement their verbal descriptions. Analyses show that speakers consistently lateralize kinship relationships: family members from the mother's side are placed on the left, and those from the father's side on the right in the speaker's gesture space. Additionally, gestures describing marital relationships frequently align along two diagonal directions of the sagittal axis, a pattern mirrored in the few diagrams participants drew on the ground. These findings suggest that Paamese speakers rely on a spatial template to think about and communicate kinship relations. I will argue that extending investigations of kinship structures beyond kinship terminologies alone and including other semiotic systems like hand gestures can reveal additional dimensions of how people cognitively represent and communicate social structures, offering new insights into the diversity of kinship systems.

Devylder, S., Hinnel, J., van de Weijer, J., Brink Andersen, L., Laporte-Devylder, L., & Kulukul, H. K. T. (2024). Kin cognition and communication: What talking, gesturing, and drawing about family can tell us about the way we think about this core social structure. *Cognitive Science*, 48(9), e13484.

**Keywords:** Kinship typology; Gesture; Relational thinking; Spatial thinking; Perspective taking; Spatial semantics; Multimodality

**Presentation type:** Original Research Talk

**Session:** Decoding hand gestures: Insights into meaning and communication

## PERCEPTION, DECISION MAKING, AND ACTION IN SPORT

### Gender differences in the interference between frequency-tapping and speed-strooping in a cognitive-motor dual task

Judith Ahle <sup>1</sup>, Lukas Reichert <sup>1\*</sup>, Marie-Therese Fleddermann <sup>1</sup>, Nora Cermak <sup>1</sup>, Markus Raab <sup>2</sup>,  
Björn Wieland <sup>1</sup>, Karen Zentgraf <sup>1</sup>

<sup>1</sup> Goethe University Frankfurt, <sup>2</sup> German Sport University Cologne

Simultaneous performance of a perceptual-cognitive and a motor task is performance-relevant in interactive sports and is measured via cognitive-motor dual-task (DT) paradigms under time pressure. This typically leads to performance decrements compared to single task performance (ST) (costs; Moreira et al., 2021). We focused on motor costs to analyze possible underlying factors (e.g., gender, cognitive performance). As part of the in:prove project, 117 elite athletes (female = 55) completed a speed cognitive-motor DT. Maximal tapping frequency (i.e., alternating foot contacts) and Stroop performance were assessed under ST and DT. Furthermore, cognitive performance (e.g., processing speed, working memory) was measured. For tapping frequency, a 2 x 2 ANOVA ('condition'; 'gender'), for motor costs, a multiple linear regression with all variables were calculated. Results indicate main effects for 'condition' ( $F(1,115) = 233.75$ ,  $p < .001$ ,  $\eta^2 = .67$ ) with higher tapping frequency in ST as well as for male athletes ( $F(1,115) = 27.94$ ,  $p < .001$ ,  $\eta^2 = .20$ ). Notably, an interaction effect emerges ( $F(1,115) = 4.16$ ,  $p = .044$ ,  $\eta^2 = .035$ ), with females showing greater reduction in tapping frequency under DT. Multiple linear regression indicates 'gender' ( $\beta = .28$ ,  $p = .060$ ) and 'Stroop performance' ( $\beta = .40$ ,  $p = .011$ ) as predictors of motor costs ( $F(3,45) = 3.38$ ,  $p = .026$ , adjusted  $R^2 = .13$ ), but not 'cognitive performance'. This suggests that motor costs in speed tasks are higher in females and in individuals with lower Stroop performance – the latter primarily driven by female athletes.

**Keywords:** motor costs, sports performance, elite athletes

**Presentation type:** Original Research Talk

**Session:** Perception, decision making, and action in sport



## Differences of producing head fakes with and without a social partner

Nils Tobias Böer \*, Iris Güldenpenning , Matthias Weigelt

*Paderborn University*

The head fake in basketball is a scenario in which a basketball player passes the ball in one direction (e.g., to the right) while turning the head in the opposite direction (e.g., to the left). As the head orientation conflicts with the perceived pass direction, responses to passes with head fakes are slower and more error prone than responses to passes without head fakes (head-fake effect; Kunde et al., 2011). Interestingly, players performing a head fake in lab studies without a opposing player showed response-response incompatibility costs, evident in higher initiation times and error rates (Güldenpenning et al., 2023), as s/he must execute a passing movement in one direction while turning the head into the contrary direction. The current study investigated if the fake production costs are increased by the presence of a social partner. Such social costs can occur as the person who performs a deceptive action violates the social rule to not deceive another person (Foerster et al., 2019). Moreover, monitoring the consequences intended by a deception might also produce costs (Wirth et al., 2018). Accordingly, we predict that the fake production costs are higher with the intention to deceive a social partner (i.e., in a social scenario) as compared to when a participant performs the movement on his/her own (i.e., in an individual scenario). We will compare the initiation times and error rates of the attacking player between the social scenario with a defending player (opponent) and the individual scenario without a defending player.

**Keywords:** deception, action preparation, perception, movement planning, sport psychology

**Presentation type:** Original Research Talk

**Session:** Perception, decision making, and action in sport

---

## Response inhibition for the basketball pump fake with responses of different complexity

Carolin Wickemeyer \*, Iris Güldenpenning , Matthias Weigelt

*Paderborn University*

Even NBA players fall for pump fakes in approximately 73% of the time and initiate erroneous blocking movements. To investigate the point where inappropriate defensive movements can no longer be inhibited, two experiments were conducted. The aim of Experiment 1 was to validate suitable stimulus material for constructing a basketball-specific anticipation-response inhibition (ARI) task and Experiment 2 investigated response inhibition in a real-life response scenario. In both experiments, a video of a basketball jump shot was presented and in Experiment 1 participants were instructed to release the space bar at the point when the ball leaves the player's fingertips (go-trials), while in Experiment 2 they were required to jump up and press a buzzer at the ceiling to "block" the shot. In 25% of all trials, a simulation of a pump fake was presented, and participants should withhold their response (stop-trials). To measure response inhibition ability, the point-of-no-return (PNR, signifying a response-inhibition rate of 50%) was calculated. In Experiment 1, the PNR was located 177 ms before the point of ball release and in Experiment 2 the PNR was located 462 ms with and 153 ms without movement time. Participants delayed their responses after stop-trials in a subsequent go-trial in Experiment 1 [ $F(2, 46) = 65.590$ ,  $p < .001$ ;  $\eta^2 = .740$ ] as well as in Experiment 2 [ $F(2,40) = 22.245$ ,  $p < .001$ ;  $\eta^2 = .527$ ], which reflects strategic post-stop-trial adjustments. In addition, biomechanical parameters are discussed that provide important further insights concerning the inhibition of a defensive action.

**Keywords:** response inhibition, basketball, deceptive actions, anticipation skills, motor control

**Presentation type:** Original Research Talk

**Session:** Perception, decision making, and action in sport

## **A home advantage in offside decisions in German professional football (soccer)**

Peter Wühr <sup>1\*</sup>, Philip Furley <sup>2</sup>, Daniel Memmert <sup>2</sup>

<sup>1</sup> TU Dortmund, <sup>2</sup> Deutsche Sporthochschule Köln

Football teams perform more successfully when playing at home than when playing away. A possible cause for this home advantage is that spectators bias referee decisions in favour of the home team. This study is the first to investigate a possible home advantage in offside decisions in football. Therefore, we analysed archival data from 1,836 matches from the German Bundesliga. We observed a home advantage in offside decisions when the effects of team dominance on the number of offside decisions were removed by calculating an offside score. The presence or absence of the video-assistant referee (VAR) did not affect the home advantage in offside decisions. Moreover, the home advantage in offside decisions occurred only in the presence of spectators and increased with their number. In summary, our study provided first evidence for a home advantage in offside decisions of professional referees, which might be related to spectator presence or behaviour.

**Keywords:** home advantage, offside decision, referee bias, football (soccer)

**Presentation type:** Original Research Talk

**Session:** Perception, decision making, and action in sport

---

## **Response inhibition performance in hand- and foot-dominated team sports**

Marie-Therese Fleddermann <sup>\*</sup>, Jan Münzberg , Björn Wieland , Lukas Reichert , Kevin Kühn , Karen Zentgraf

*Goethe University Frankfurt*

Elite team sport athletes demonstrate better response inhibition performance compared to semi-elite athletes (Heppe & Zentgraf, 2019), presumably as they have more experience with dynamic game contexts. However, whether this experience is related to effector-specific differences (i.e., feet

in soccer, hands in basketball) has not yet been investigated. Therefore, the aim of the study was to study response inhibition tasks ('hand'; 'foot') in hand-dominated (basketball) and foot-dominated (soccer) athletes. We hypothesized that basketball athletes would show superior performance with the effector 'hand', whereas football athletes with the effector 'foot'. A total of 122 athletes (nbasketball = 63) performed a stop-signal task (Verbruggen et al., 2008), using both hands and feet. Response inhibition performance was assessed by calculating individual stop-signal reaction times (SSRT). To evaluate differences in SSRT, a 2 x 2 ANOVA ('effector'; 'group') was conducted. Results indicate a main effect for 'group' ( $F(1,120) = 11.41$ ,  $p < .01$ ,  $\eta^2 = .09$ ), with better SSRT for soccer athletes, and a main effect for 'effector' ( $F(1,120) = 97.07$ ,  $p < .01$ ;  $\eta^2 = .45$ ), with superior response inhibition performance for 'hand'. No interaction effect was found ( $p > .05$ ). Contrary to our expectations and surprisingly, we did not find superior performance in effector-specific tasks, but soccer athletes outperforming basketball athletes in both effectors. Re- and post-hoc analyses will elaborate on finding explanations for this, e.g., post-error-slowness, expertise levels, or strategies.

**Keywords:** elite athlete, SSRT, stop-signal task

**Presentation type:** Original Research Talk

**Session:** Perception, decision making, and action in sport

## SHAPING COGNITION: THE INTERPLAY OF LANGUAGE, SPACE, AND THOUGHT

---

### The role of contextual alignment in artificial grammar learning

Michael Ramscar <sup>1\*</sup>, Holly Jenkins <sup>2</sup>, Elizabeth Wonnacott <sup>2</sup>

<sup>1</sup> University of Tübingen, <sup>2</sup> University of Oxford

Learners normally acquire their first languages in context. While this poses problems – e.g., referential ambiguity – it might also provide benefits, such as ensuring that appropriate patterns of relations between words are acquired. Another benefit that could arise from learning in context is that while obvious similarities among referents might be learnable in isolation, some subtle

differences could be better discerned in contexts that allow referents to be aligned (Markman & Gentner, 1997). Since second language learning often occurs in sparse contexts, this may explain why L2 learners struggle to acquire aspects of grammar encoding differences. To explore the impact of learning in and out of context, we trained participants on an artificial language containing a grammatical gender system – which L2 learners typically struggle to learn – that systematically matched a set of morphological markers to differences among the features of its nouns. A between-participants experiment contrasted a traditional "presentation training paradigm" in which referential phrases and corresponding images were introduced individually, with a novel "alignment error paradigm" where referential phrases were presented alongside two images, and learners had to guess the correct match. Our results show that although noun-phrases were learned well in both paradigms, morphological generalization only occurred when training allowed for contextual alignment, suggesting that this may be critical for learning many aspects of grammatical structure. Markman, A. B., & Gentner, D. (1997). The effects of alignability on memory. *Psychological Science*, 363-367.

**Keywords:** Learning, language, alignment, L2 learning, representation

**Presentation type:** Original Research Talk

**Session:** Shaping cognition: The interplay of language, space, and thought

---

## Relational Language and Relational Thought

Dedre Gentner \*

*Department of Psychology, Northwestern University*

The acquisition of language invites symbolic representation. Language provides representational resources that are used to encode and reason about situations. In particular, relational language supports relational representation, which is crucial to human cognitive powers. A relational term such as carnivore or consequence is both an invitation to derive a relational meaning and a label that helps preserve the relational pattern once it is grasped. I suggest three specific ways in which relational language contributes to human cognition.

(1) Common labels invite comparison and abstraction. When two things have the same name, even 2-year-olds are more likely to compare them. The implicit assumption is that there is something alike

about them.). The resulting common system is likely to be more abstract than the original representations, rendering it more portable to further situations.

(2) Linguistic labels promote reification. Naming a relational constellation confers stability and increases the likelihood of retention and reuse.

(3) Metaphoric extension of linguistic terms supports abstract thought. This is especially clear in extensions of spatial relational terms, such as prepositions.

I'll illustrate these points with empirical studies of the effects of language on cognition in adults and children.

**Keywords:** Relational language, Language and cognition

**Presentation type:** Original Research Talk

**Session:** Shaping cognition: The interplay of language, space, and thought

---

## The role of language in the diffusion of cognitive practices

Juergen Bohnemeyer \*

*University at Buffalo - SUNY*

While cognitive anthropologists have been studying the role of culture in cognition since the 1940s, mainstream theorizing in the cognitive sciences has tended to minimize and trivialize the role of culture. Some concepts that may help close the gap include the notions of cognitive practices and carrier behaviors – perceivable behaviors that provide cues to the underlying cognitive practices. Here, I present evidence from four sources converging on the conclusion that language serves as a powerful, but non-exclusive, carrier behavior in the diffusion of spatial frames of reference: (i) A survey of the available literature, comprising studies of some 50 individual populations from around the world, shows that preferences for relative frame use in small-scale space appear to be restricted to highly developed large-scale societies; (ii) a second meta-study comes to the conclusion that in all populations in which there is no linguistic bias for either extrinsic frame type (relative vs. geocentric), there is evidence for geocentric encoding preferences in recall memory; (iii) research with non-human primates and developmental studies with human infants point toward a prevalence of geocentric frame use in the early stages of both ontogenetic and phylogenetic evolution; (iv) modeling frame use against sociodemographic and environmental data from eight populations of North America and Asia points to language as a dominant factor, but also to consistent effects of

urbanization, literacy, and formal education. The emerging view of language as a non-exclusive carrier behavior in the cultural diffusion of cognitive practices implies a reinterpretation of linguistic relativity.

**Keywords:** culture-specificity in cognition, carrier behaviors, linguistic relativity, spatial frames of reference

**Presentation type:** Original Research Talk

**Session:** Shaping cognition: The interplay of language, space, and thought

---

## The role of spatial distance in abstract thinking and object recognition

Karin M. Bausenhart \*, Rolf Ulrich , Barbara Kaup

*University of Tübingen*

Psychological research indicates that spatial factors can fundamentally impact human cognition, as demonstrated by the role of spatial reference frames in object recognition and memory, and the grounding of abstract concepts like time or number in spatial dimensions through metaphorical mapping. In the present work, I will focus on another spatial factor that may systematically influence how individuals process and organize information, thereby affecting both the content and structure of thought: distance. For instance, theoretical frameworks such as Construal Level Theory (CLT; Trope & Liberman, 2010) suggest that as the distance to an object or event increases, individuals tend to adopt higher-level construals, emphasizing abstract, amodal, and decontextualized features and overarching goals, rather than specific, concrete, and modal details. Conversely, proximal spatial contexts promote more concrete thinking, heightening attention to immediate, specific details and situational constraints. In this talk, I will review evidence supporting this hypothesis from language comprehension research, and present novel findings from a pre-registered series of experiments investigating whether spatial distance also influences non-linguistic object recognition. Specifically, these experiments test whether the automatic activation of specific, modal object features diminishes with increasing distance, as predicted by CLT. I will discuss these results in light of the idea that the abstractness of cognitive representations is fundamentally flexible (Kaup et al., 2024), allowing for adaptation to situational demands and affordances that are (at least in part) shaped by spatial distance.

**Keywords:** cognitive representation, distance, space, thinking, construal level

**Presentation type:** Original Research Talk

**Session:** Shaping cognition: The interplay of language, space, and thought

---

## Language as a categorical overlay on thought and perception

Gary Lupyan \*

*University of Wisconsin-Madison*

On one widespread view, language maps word-forms to concepts. On this view, concepts exist independently from and prior to language. Alternatively, many of our concepts — including some that seem very basic—may derive from our experience with, and use of, language. On this alternative, language takes on a more transformative role in augmenting human cognition. I will argue in favor of this second view and present several studies showing how words help structure and align our concepts by serving as categorical overlays on thought and perception.

**Keywords:** language, labeling, categorization, perception

**Presentation type:** Original Research Talk

**Session:** Shaping cognition: The interplay of language, space, and thought



# REAL FEARS IN VIRTUAL WORLDS: BEHAVIOR, PHYSIOLOGY, AND NEURAL MECHANISMS

---

## Predictors of subjective fear and anxiety in naturalistic VR tasks

Lukas Kornemann <sup>1\*</sup>, Olivier de Vries <sup>1</sup>, Ulises Serratos <sup>2</sup>, Dominik Bach <sup>1, 2</sup>

<sup>1</sup> *University of Bonn, Transdisciplinary Research Area Life and Health, Hertz Chair for Artificial Intelligence and Neuroscience*, <sup>2</sup> *Wellcome Centre for Human Neuroimaging, UCL Queen Square Institute for Neurology, University College London*

Recent research on anxiety has increasingly focused on physiological markers and behavioral responses, often overlooking the subjective experience of anxiety itself. This is problematic, as anxiety is fundamentally a subjective emotional experience. To deepen our understanding of anxiety, it is essential to study the specific conditions that are most strongly linked to how individuals personally experience anxiety. To address this gap, we conducted an experiment using virtual reality (VR) to simulate a foraging task under threat of predation. Participants navigated virtual environments while facing various threats, and, after each trial rated their subjective experience of anxiety as well as other emotions. This setup allowed us to manipulate environmental variables and track how participants' actions, the immediate context, and the outcomes of those actions influenced their subjective emotional state. Using factor analysis and multilevel modeling, we analyzed the relative contributions of these different factors—environmental conditions, participant behavior, and outcomes—to the subjective experience of anxiety. Our results offer new insights into the dynamics of anxiety, revealing how different elements of a threatening situation interact to shape how anxiety is felt and perceived. This work highlights the importance of studying predictors of anxiety under naturalistic conditions, where participants are free to move without many constraints. By doing so, we can develop more comprehensive models of anxiety that better reflect its complex, real-world manifestations, ultimately improving both clinical interventions and theoretical understanding.

**Keywords:** Virtual Reality, Emotion, Human Defensive Behavior

**Presentation type:** Original Research Talk

**Session:** Real fears in virtual worlds: Behavior, physiology, and neural mechanisms

## Virtual Paradigms, Real fear, and Avoidance?

Pauline Dibbets \*

*Maastricht University, Faculty of Psychology and Neuroscience, dept Clinical Psychological Science  
The Netherlands*

Anxiety is not only marked by heightened fear, but also by the avoidance of feared situations. Most experimental paradigms studying avoidance tend to limit or constrain participants' response options, reducing their ecological validity. To address this, our team is working on developing innovative paradigms that evoke fear, promote free exploration, and allow for the measurement of more natural avoidance behaviors.

**Keywords:** Virtual reality, fear, avoidance, gamification

**Presentation type:** Original Research Talk

**Session:** Real fears in virtual worlds: Behavior, physiology, and neural mechanisms

---

## Navigating the Approach-Avoidance Matrix: A Novel Task in a Foraging Environment Using Virtual Reality.

Alexandros Kastrinogiannis <sup>1, 2\*</sup>, Tina B. Lonsdorf <sup>1, 3</sup>

<sup>1</sup> *Institute for Systems Neuroscience, University Medical Center Hamburg-Eppendorf, Hamburg, Germany,* <sup>2</sup> *Department of Neurology, Max Planck Institute for Human Cognitive and Brain Sciences, Leipzig, Germany,* <sup>3</sup> *University of Bielefeld, Biological Psychology and Cognitive Neuroscience, Bielefeld, Germany*

A key characteristic of adaptive fear is the avoidance of genuinely threatening situations or stimuli. However, excessive avoidance of such hazards can have negative long-term consequences by preventing the acquisition of safety information, thereby maintaining anxiety. Recent research has focused on approach-avoidance (AA) conflicts in foraging tasks under predation threat, particularly in decision-making strategies. However, the impact of individual differences on AA strategies within threatening contexts remains unclear.

We present a novel approach-avoidance paradigm in a virtual foraging task, using a matrix-designed environment to track and visualize AA behavior based on spatial movement. In this study, 242 participants were tasked with collecting a sufficient number of food tokens across three simulated environments (forest, water, desert) over 24 trials to ensure virtual survival. The AA conflict was induced by proportionally linking potential rewards to the probability of encountering an aversive (electrical) stimulus. Each individual had to perform specific AA behaviors, determined by the time spent in each environment and spatial movement across the field. Our data validate this task and demonstrate the utility of a gamified virtual reality design that uses both rewards and punishments to elicit AA behavior continuously. Additionally, our findings suggest the potential for identifying subgroups based on task performance and physiological measures (such as skin conductance level). Exploratory analyses further reveal associations between individual differences and behavioral outcomes, providing insights into the variability of AA strategies across participants.

**Keywords:** approach-avoidance, VR, reward, gamification

**Presentation type:** Original Research Talk

**Session:** Real fears in virtual worlds: Behavior, physiology, and neural mechanisms

---

## A Multimodal Social Conditioning Study in Virtual Reality Showing Fast Adaptation to Affective Social Learning Experiences

Sabrina Gado \*, Matthias Gamer

*Julius-Maximilians-Universität Würzburg*

Social functioning relies on effectively balancing social approach and avoidance behaviors. maladaptive, exaggerated social avoidance constitutes a risk factor for the development of social anxiety disorder. To explore how people learn from social experiences in a naturalistic yet controlled setting, we developed an immersive virtual environment that combines a social conditioning procedure with a social approach-avoidance test previously applied in animal research. In two experiments (both  $N = 48$ ) we investigated how participants with varying levels of trait social anxiety adapt their approach and avoidance tendencies toward conditioned virtual agents. We examined adaptations in the behavior (whole-body movements, interpersonal distance), visual exploration (gaze behavior), and subjective experience (perceived likeability, fear, and anger), alongside autonomic measures (pupil dilation, electrodermal activity, and heart rate). Across the experiments,

we found that the social conditioning procedure significantly influenced participants' exploration behaviors, including interpersonal distance and spontaneous fixations, as well as their subjective evaluations of the virtual agents. Although autonomic responses varied during the social encounters, no long-term physiological adaptations persisted during the social approach-avoidance test. Importantly, trait social anxiety was associated with higher fear ratings and increased interpersonal distance. This study demonstrates the potential of immersive virtual environments for examining social learning processes under conditions resembling real-life social encounters.

**Keywords:** social attention, social conditioning, virtual reality

**Presentation type:** Original Research Talk

**Session:** Real fears in virtual worlds: Behavior, physiology, and neural mechanisms

## UNVEILING THE FUTURE OF MASKED PRIMING: INNOVATIONS, CHALLENGES, AND COLLABORATIVE PATHWAYS

---

### Subjective and objective measures of visual awareness converge across feature types and task modes

Markus Kiefer \*, Thomas Kammer

*Ulm University, Department of Psychiatry*

In consciousness research, such as the study of masked priming, various methods are used to measure the content of visual awareness: Subjective measures rely on the observer's introspection regarding the perceptual experience, whereas objective measures rely on the observer's performance in accurately detecting or discriminating the stimulus of interest over a series of trials. The most appropriate measure of awareness is currently debated. To contribute to this debate, we compared subjective and objective awareness measures across different stimulus features using a temporal two-alternative forced-choice (2-AFC) task mode as well as a classical two-category task mode on single stimuli. Compared to the two-category single-stimulus task mode, the temporal 2-AFC task mode is thought to specifically minimize biases due to unconscious processing.

Thresholds based on subjective ratings with the Perceptual Awareness Scale (PAS) and on performance accuracy were determined for detection (stimulus presence, only temporal 2AFC task mode) and discrimination (letter case, both task modes) tasks, performed on masked word stimuli. We found a comparable pattern of thresholds across tasks and task modes for objective and subjective measurements of awareness. Although subjective measures have sometimes lagged behind objective measures in previous studies, the present experiments demonstrate a convergence of measures. The observed similarity of thresholds across task modes confirms that psychophysical and subjective measures of awareness provide converging, and thus most likely equally veridical, measures of awareness. Our work thus refutes arguments that subjective measures should be preferred to objective measures in consciousness research because of their greater specificity.

**Keywords:** psychophysics, consciousness, visual masking, visual awareness ratings, perceptual awareness scale

**Presentation type:** Original Research Talk

**Session:** Unveiling the future of masked priming: Innovations, challenges, and collaborative pathways

---

## Better evidence for unconscious priming: double dissociations plus indirect task advantages

Sascha Meyen \*, Volker H. Franz

*University of Tübingen*

Studies on unconscious priming suffer from methodological issues. Typically, evidence for unconscious processing of a prime stimulus comes from two tasks: (1) In the direct task, participants attempt to discriminate the prime stimulus and discrimination performance is low. (2) In the indirect task, participants respond to another (target) stimulus and the prime nevertheless produces a response time effect. This pattern of results seems to demonstrate that the prime was processed beyond what participants can consciously report, and (with further assumptions) is often taken as evidence for unconscious priming. But this approach is highly problematic. Schmidt & Vorberg (2006) advocated pursuing a more insightful pattern of results: a *double dissociation*. For double dissociations, researchers would show that — from one experimental condition to another —

the indirect task response time effect decreases while the direct task discrimination performance increases. With few assumptions, such a pattern of results provides evidence for two dissociated processes (from which one may reflect unconscious processing). One of the required assumptions, the weak monotonicity assumption, can be put into question. Here, we argue that this assumption can be replaced by an empirical result: The finding that the indirect task shows higher sensitivity to the prime than the direct task, which we dubbed *indirect task advantage*. When demonstrated jointly, a double dissociation *and* an indirect task advantage, both pieces of evidence would provide a solid foundation for further interpretations. Such an empirically focused approach could be promising in advancing research on unconscious processing.

**Keywords:** masked priming, double dissociation, indirect task advantage, unconscious processing

**Presentation type:** Original Research Talk

**Session:** Unveiling the future of masked priming: Innovations, challenges, and collaborative pathways

---

## Does priming require awareness? How trial-wise awareness assessment interferes with masked priming

Michaela Rohr <sup>1\*</sup>, Markus Kiefer <sup>2</sup>, Dirk Wentura <sup>1</sup>, Marcel Harpaintner <sup>2</sup>

<sup>1</sup> Saarland University, <sup>2</sup> Ulm University

Recently, a new trial-wise assessment method of subjective awareness has been introduced into the field of masked priming, namely the Perceptual Awareness Scale (PAS, Ramsøy & Overgaard, ; Lähteenmäki et al., 2015). The scale reignited the old debate about whether non-conscious processing is possible at all. While some studies claimed that non-conscious processing would be a methodological artifact of inadequate awareness assessment (Lähteenmäki et al., 2015), we provide evidence that the perceptual awareness scale itself is problematic, because it interferes with the processes underlying masked priming. Specifically, we examined masked semantic and affective priming effects, using either traditional objective forced-choice prime recognition and retrospective summary reports of subjective awareness, or trial-by-trial ratings of subjective awareness using the PAS. Using the same prime duration and masking conditions (i.e., 20 ms, 40 ms, 60 ms), the PAS-absent groups yielded reliable masked priming effects. In the PAS-present groups, residual priming effects, based on response-related processes, were observed when prime

awareness was present. We conclude that trial-by-trial subjective awareness ratings can abolish masked priming effects due to the altered processing strategies.

**Keywords:** masked presentation, priming, semantic, evaluative, awareness

**Presentation type:** Original Research Talk

**Session:** Unveiling the future of masked priming: Innovations, challenges, and collaborative pathways

---

## Unconscious processing – probing the dual-task structure of masked priming paradigms holding an online prime response

Charlott Wendt \*, Guido Hesselmann

*Department of General and Biological Psychology, Psychologische Hochschule Berlin, Germany*

In masked priming paradigms that incorporate “online” prime visibility judgments, participants are required to respond to the prime on each trial, either through a subjective report or an objective discrimination task. Our research is based on the observation that paradigms involving such trial-by-trial prime assessments constitute dual-task situations. We conducted three experiments using metacontrast masking to investigate unconscious priming from a dual-task perspective. We manipulated different characteristics of the direct (prime-related) task to examine their potential influence on the indirect (target-related) task and the resulting priming effects. In Experiment 1, we manipulated response modality and the complexity of the direct task, which involved a subjective perceptual awareness scale. Specifically, we compared a unimodal response modality condition (manual-manual) with a cross-modal condition (manual-vocal), and a high-complexity condition (4-point rating scale) with a low-complexity condition (2-point rating scale). Experiment 2 aimed to replicate the findings from the complexity manipulation, but instead of varying response modality, we varied hand usage, comparing a one-hand condition to a two-hands condition. Experiment 3 was a variation of Experiment 2, featuring different stimulus materials and employing an objective direct task, requiring participants to identify the direction of the prime arrow. As expected, response times were longer in the dual-task compared to the single-task condition, while the priming effects showed no clear pattern. Consistent with previous research, we found dual-tasking costs in the unimodal and high-complexity conditions. However, unexpectedly, the two-hands condition showed an advantage. We will discuss implications of these findings and suggest directions for future research.

**Keywords:** masked priming, metacontrast masking, unconscious processing, dual-tasking

**Presentation type:** Original Research Talk

**Session:** Unveiling the future of masked priming: Innovations, challenges, and collaborative pathways

---

## Functional dissociations vs. post-hoc selection

Thomas Schmidt \*, Xin Ying Lee , Maximilian Wolkersdorfer

*University of Kaiserslautern-Landau (RPTU)*

A common practice in research on unconscious cognition is to exclude trials with high visibility ratings or to exclude participants with high sensitivity for the critical stimulus. Based on standard signal detection theory for discrimination judgments, we show that post-hoc trial selection only isolates points of neutral response bias but remains consistent with uncomfortably high levels of sensitivity. We argue that post-hoc selection constitutes a sampling fallacy that capitalizes on chance, generates regression artifacts, and wrongly ascribes unconscious processing to stimulus conditions that are far from indiscriminable. As an alternative, we advocate the study of functional dissociations, where direct (D) and indirect (I) measures are conceptualized as spanning up a two-dimensional D-I space and where single, sensitivity, and double dissociations appear as distinct curve patterns. While most studies employing post-hoc selection are confined to only a single line of that space where  $D \approx 0$ , functional dissociations can utilize the entire space, circumventing requirements like null visibility and exhaustive reliability, and allowing for the planful measurement of theoretically meaningful functional relationships between experimentally controlled variables.

**Keywords:** Unconscious cognition, regression to the mean, task dissociations, statistical artifacts, masked priming

**Presentation type:** Original Research Talk

**Session:** Unveiling the future of masked priming: Innovations, challenges, and collaborative pathways



# CURRENT DEVELOPMENTS IN EVALUATIVE CONDITIONING I – FROM THE LAB TO THE REAL WORLD

---

## Evaluative Conditioning in a lecture hall

Anne Gast <sup>1\*</sup>, Jasmin Richter <sup>2</sup>, Claudine Pulm <sup>1</sup>, Taylor Benedict <sup>1</sup>

<sup>1</sup> *University of Cologne*, <sup>2</sup> *University of Oslo*

Evaluative conditioning is often assumed to underlie many of the attitudes that play a role in our everyday lives. Evaluative conditioning consists of a change in valence that is due to pairings of a neutral stimulus (for example a person or a product) with a positive or negative stimulus (for example a likeable or dislikeable person, a negative news report, or an attractive landscape). Because such stimuli regularly occur in people's lives, one might argue that people might change their attitudes due to evaluative conditioning on a regular basis. On the other hand, such a general mechanism might not be adaptive. Based on a Declarative Memory of evaluative conditioning (Gast, 2018), we argue that people need to retrieve the relevant stimulus pairings for an EC effect to occur. This in turn requires sufficient attention when observing the relevant stimuli (CS and US). While in lab studies attention to these stimuli is usually high, this is not necessarily the case if the stimuli occur in the background of people's everyday activities. In this project we therefore test evaluative conditioning in a specific everyday context and with relatively unobtrusive presentation of CS-US-pairings.

I will present results from six studies in which we presented picture-picture pairings to students during university lectures. Results from these studies suggest that evaluative conditioning effects in such a setting might be scarce. It might play a role how salient the stimuli are. I will discuss some implications of these studies.

**Keywords:** evaluative conditioning, everyday context, memory, attention

**Presentation type:** Original Research Talk

**Session:** Current developments in evaluative conditioning I – From the lab to the real world

## **Evaluative conditioning off the track: Conditioning attitudes in an (almost) open world**

Tobias Vogel \*

*Darmstadt University of Applied Sciences*

Since the advent of research on attitude conditioning, Evaluative Conditioning (EC) has become a cornerstone concept in the field of attitude formation. Numerous experiments have demonstrated the phenomenon's robustness across highly standardized paradigms. However, its significance in more realistic and complex learning environments remains largely theoretical. In this presentation, I will discuss studies exploring EC within the context of video games. While these studies provide evidence of EC in complex learning settings, they also highlight the need for more refined EC theories to enable accurate predictions beyond the laboratory.

**Keywords:** attitudes, evaluative conditioning, paradigm, applied psychology, consumer psychology

**Presentation type:** Original Research Talk

**Session:** Current developments in evaluative conditioning I – From the lab to the real world

---

## **Recent evidence dismissing the role of demand characteristics in evaluative conditioning effects remains unimpressive - at best**

Olivier Corneille \*

*UCLouvain*

Concerns have long been raised about the potential influence of demand characteristics in evaluative conditioning procedures. Demand accounts of evaluative conditioning effects were dismissed early on due to findings that purportedly supported the existence of unconscious conditioning effects. Over the past two decades, however, unconscious conditioning effects have struggled to withstand rigorous empirical scrutiny (for a recent discussion, see Gawronski and Corneille, 2024). Consequently, the original question has resurfaced: should evaluative conditioning

effects be considered demand artifacts? In this presentation, I will critically examine new evidence addressing this question. While acknowledging these recent empirical efforts, I ultimately argue that the evidence ranges from unimpressive to entirely nonsensical.

**Keywords:** Evaluative conditioning; attitude change; demand effects; demand characteristics; methods artifact.

**Presentation type:** Original Research Talk

**Session:** Current developments in evaluative conditioning I – From the lab to the real world

---

## Effects of evaluative conditioning on peripheral visual attention

Alexandra E. Clausen <sup>1\*</sup>, Jenny McMahon <sup>1</sup>, Florian Kattner <sup>2</sup>, C. Shawn Green <sup>3</sup>

<sup>1</sup> *Technical University of Darmstadt*, <sup>2</sup> *Health and Medical University*, <sup>3</sup> *University of Wisconsin-Madison*

Peripheral visual attention can be modified through extensive training or perceptually demanding experiences such as video gaming. However, it is unclear to what extent attention to peripheral targets is guided by their valence acquired through evaluative conditioning. In the present study, black-and-white geometric shapes were paired with either neutral, positive, or negative images in an evaluative conditioning procedure. The conditioned stimuli (CSs) were then presented as targets in a useful field of view task measuring the eccentricity of visual attention (20 and 30°). Detection thresholds for presentation duration were determined with a 3-down/1-up staircase procedure. Evaluative conditioning effects were measured with direct evaluative ratings. Detection thresholds differed between the eccentricity conditions in the useful field of view task, with lower thresholds at 20° eccentricity. There were no significant differences in detection thresholds due to valence. The results are discussed with regard to a still possible role of acquired valence in the guidance of visual attention.

**Keywords:** Evaluative conditioning, attention, peripheral vision, useful field of view task

**Presentation type:** Original Research Talk

**Session:** Current developments in evaluative conditioning I – From the lab to the real world

## CURRENT DEVELOPMENTS IN EVALUATIVE CONDITIONING II – CONTROL AND MEMORY

---

### Memory specificity in evaluative conditioning: a multinomial processing tree approach

Karoline Bading \*, Mandy Hütter

*University of Tübingen*

Evaluative conditioning (EC) is defined as a change in the evaluation of a neutral „conditioned“ stimulus (CS) after its pairing with a valenced „unconditioned“ stimulus (US). EC effects are known to depend on associative memory for the CS-US pairings and to generalize to stimuli that share features with the originally presented CSs (generalization stimuli, GSs). In the present research, we introduce a multinomial processing tree (MPT) approach that combines these two lines of research. We introduce an MPT model (and its underlying measurement procedure) separating CS/US detection based on specific features vs. non-specific features (which are shared by CSs and GSs), associative memory for the specific US vs. US valence, and general response tendencies (guessing old vs. new, guessing positive US valence vs. negative US valence). We also present an experiment testing the effect of CS variability (during learning) on the generalization of EC as well as on the parameters estimated by the MPT model. Theoretical implications and possible applications in future research are discussed.

**Keywords:** evaluative conditioning, generalization, MPT modeling

**Presentation type:** Original Research Talk

**Session:** Current developments in evaluative conditioning II – Control and memory

---

## How Stimulus Modality Influences the Automaticity of Valence Transfer: Controlled and Uncontrolled Effects of Verbal versus Visual Affective Stimuli on Brand Attitudes

Kathrin Reichmann <sup>1\*</sup>, Serena D'Hooge <sup>2</sup>, Steven Sweldens <sup>3</sup>, Mandy Hütter <sup>1</sup>

<sup>1</sup> Eberhard Karls Universität Tübingen, <sup>2</sup> EDHEC Business School, <sup>3</sup> RSM Erasmus University

Recent years have seen a proliferation of evidence that simple pairings of brands with affective stimuli (e.g., emotional appeals in advertisements) can have uncontrolled effects on people's brand attitudes, known as uncontrolled evaluative conditioning (EC) effects. This raises important ethical questions regarding consumers' autonomy and the regulation of commonly used advertising techniques. In the current research, we investigate for the first time whether visual affective stimuli (pictures) differ from verbal affective stimuli (words) in the extent to which they generate controlled and uncontrolled valence transfer. As the processing differences between verbal and visual stimuli are multidimensional in nature, it is challenging to determine which type of stimuli will have more controlled or uncontrolled effects on attitudes. Three experiments consistently (and from some theoretical perspectives, unexpectedly) demonstrate that valence transfer from visual stimuli is easier to control than valence transfer from verbal stimuli. Furthermore, once control fails, verbal and visual affective stimuli appear equally effective at uncontrolled valence transfer. Theoretical as well as practical implications of our findings are discussed.

**Keywords:** evaluative conditioning, cognitive control, modality, picture superiority effect, multinomial modeling, process dissociation procedure

**Presentation type:** Original Research Talk

**Session:** Current developments in evaluative conditioning II – Control and memory

---

## Is the C parameter sensitive to an encoding time manipulation? A replication of Heycke and Gawronski's (2020) Experiment 2b with a longer response window in the speeded choice task

Karoline Bading <sup>1</sup>, Marius Barth <sup>2\*</sup>, Jérémy Béna <sup>3</sup>, Klaus Rothermund <sup>4</sup>

<sup>1</sup> University of Tübingen, <sup>2</sup> University of Cologne, <sup>3</sup> Aix-Marseille Université, <sup>4</sup> Friedrich Schiller University Jena

Heycke and Gawronski (2020) developed a multinomial processing tree (MPT) model to separate the respective contributions of stimulus relations and of stimulus co-occurrences to relational evaluative conditioning (EC) effects. In a series of experiments, Heycke and Gawronski (2020) found the *C* parameter (the MPT model's estimator of co-occurrence effects) to be unaffected by manipulations of encoding time, pairing frequency and the delay between learning and test phases, but (paradoxically) increased by a longer response window in the test phase (speeded choice task). This pattern of results is incompatible with current theorizing on the processes underlying stimulus co-occurrence effects (association formation, failures in memory retrieval) and thus requires further research on the sources and properties of the *C* parameter. In the present research, we tested whether a significant moderation of the *C* parameter by encoding time can be obtained when the test phase features a longer response window (allowing for overall larger *C* parameters). Across three experiments, we obtained robust evidence for a moderation of the *C* parameter by encoding time (with larger *C* parameters when participants were given more encoding time during the learning phase). The theoretical and methodological implications of these findings are discussed.

**Keywords:** evaluative conditioning, multinomial processing tree models

**Presentation type:** Original Research Talk

**Session:** Current developments in evaluative conditioning II – Control and memory

---

## Children's susceptibility to advertising: The (un)controllability of evaluative conditioning effects

Serena D'Hooge <sup>1\*</sup>, Mandy Hütter <sup>2</sup>, Steven Sweldens <sup>3</sup>

<sup>1</sup> EDHEC Business School, <sup>2</sup> Eberhard Karls Universität Tübingen, <sup>3</sup> RSM Erasmus University

Adult's brand attitudes can be uncontrollably influenced by simple pairings with other affective stimuli, in what are known as uncontrolled evaluative conditioning (EC) effects. This raises a pertinent concern about the extent to which children might be especially vulnerable to uncontrolled persuasive effects of advertising. While research has been proliferating on the development of children's advertising literacy, little is known about the extent to which this really protects children from undesired advertising influences. Hence, the current research investigates how uncontrolled and controlled EC effects develop in children. We offer the most comprehensive study on this topic to date with new improved paradigms suitable to be tested on children from the age of six. Three

experimental studies confirm the presence of both controlled and uncontrolled EC effects in primary school children. Children are less able to exert control compared to young adults. Uncontrolled EC effects, however, quickly reach the same strength as in young adults. Yet, the youngest children might be immune to uncontrolled effects of EC, possibly because their lower order associative learning brain systems have been insufficiently developed. Overarching, we recommend a stricter regulation and gradually adding advertising controllability trainings to the primary school curriculum.

**Keywords:** Evaluative conditioning, multinomial processing tree, advertising influences, cognitive control, childhood development

**Presentation type:** Original Research Talk

**Session:** Current developments in evaluative conditioning II – Control and memory

---

## Evaluative conditioning for 'remember', 'intuition', and 'guess' pairing memory judgments

Christoph Stahl \*

*Department of Psychology, University of Cologne*

Attitudes can be formed and changed with evaluative conditioning. In evaluative conditioning (EC), an initially neutral conditioned stimulus (CS; e.g., an unfamiliar brand name) is paired with a valent unconditioned stimulus (US; e.g., a pleasant picture). After repeated pairings, the evaluation of the CS is changed in line with the US's valence (i.e., the EC effect). It is debated whether EC reflects (semantic) memory of the pairings, or is due to a separate learning process that is independent of a participant's awareness of the pairings. The former account predicts EC effects to be associated with pairing memory, whereas the latter predicts EC in the absence of pairing memory. Here we studied EC effects for different subjective memory states - remembering, knowing, intuition/gut-feeling, and random guessing. Across three studies, EC effects were associated with above-chance pairing memory. We consistently found EC to be strongest for 'remember' states and absent for 'guess' states. We also found weaker EC effects for 'intuition/gut-feeling' states (which were associated with less accurate pairing memory). These results support an association between EC and pairing memory. Our findings also point to the possibility of EC effects occurring with weak memories that may not be subjectively experienced as such. Practical implications include the necessity for control strategies to address these weaker memory states.

**Presentation type:** Original Research Talk

**Session:** Current developments in evaluative conditioning II – Control and memory

# FREQUENCY, FLUENCY, AND EVALUATIVE CONDITIONING

---

## The role of attitude certainty in evaluative conditioning

Moritz Ingendahl <sup>1\*</sup>, Franziska Ingendahl <sup>2</sup>, Tobias Vogel <sup>3</sup>, Hans Alves <sup>1</sup>

<sup>1</sup> Ruhr University Bochum, <sup>2</sup> Technical University of Darmstadt, <sup>3</sup> University of Applied Sciences  
Darmstadt

People change their attitudes towards objects based on their co-occurrence with positive or negative stimuli, an effect called Evaluative Conditioning (EC). Previous research has primarily focused on studying the change in attitude valence as an outcome of EC, but has neglected that people can also be more or less certain of their attitude. In this talk, we will present several experiments studying the antecedents and consequences of attitude certainty in evaluative conditioning. We will discuss how repetition, stimulus frequency, memory, and attitude extremity relate to attitude certainty in evaluative conditioning.

**Keywords:** evaluative conditioning, attitudes, certainty, repetition, metacognition

**Presentation type:** Original Research Talk

**Session:** Frequency, fluency, and evaluative conditioning



## **(No) Valence Asymmetries in Evaluative Conditioning**

Lea Sperlich \*, Christian Unkelbach

*University of Cologne*

Learning typically shows a negativity bias. Yet, in our re-analysis of meta-analytic evaluative conditioning (EC) data, we found no evidence of such bias. We provide a cognitive-ecological explanation for this lack of negativity bias. Ecologically, negative stimuli are rare, while positive stimuli are frequent. However, EC experiments typically present a balanced distribution of unconditioned stimuli (USs). In a first set of pre-registered studies (N = 785), we manipulated the frequency distribution of USs. Our results revealed symmetrical valence asymmetries: both rare positive and rare negative USs led to stronger EC effects. In a second set of pre-registered studies (N = 1200), we examined how participants evaluated groups when either one member was paired with a negative/positive US or four members were paired with positive/negative USs. If participants rated the group, pairing one member was as effective as pairing four members; yet, the rare pairing did not lead to a valence asymmetry. We discuss possible explanations for these results and suggest several paths for future research.

**Keywords:** evaluative conditioning, attribute acquisition, negativity bias, information ecology, valence asymmetry

**Presentation type:** Original Research Talk

**Session:** Frequency, fluency, and evaluative conditioning

---

## **Larger Evaluative Conditioning Effects for Fluent Stimuli**

Claudine Pulm \*, Anne Gast

*University of Cologne*

Processing fluency, the ease or difficulty with which new information can be processed, is a factor known to affect evaluative outcomes. However, it is often overlooked in evaluative conditioning (EC) experiments. We investigated whether and how the fluency of the conditioned stimuli (CSs)

influences EC outcomes. Across three experiments (N = 296; N = 288; N = 287), we found larger EC effects for fluent compared to disfluent CSs. We also explore the extent to which those fluency effects might be explained by a better memory for fluent compared to disfluent CSs.

**Keywords:** Evaluative Conditioning, Processing Fluency, Metacognition, Attitude Formation

**Presentation type:** Original Research Talk

**Session:** Frequency, fluency, and evaluative conditioning

---

## **More is more, or is there more to it? A comprehensive investigation into effects of frequency in evaluative conditioning**

Mandy Hütter \*, Kathrin Reichmann , Marco Denin , Dana Höffler

*Eberhard Karls Universität Tübingen*

Evaluative conditioning (EC) is an experimental paradigm that models the acquisition of attitudes based on co-occurrences between conditioned stimuli (CSs) and unconditioned stimuli (USs). In a typical EC procedure, CS and US are paired several times. However, whether and under which conditions the frequency of such co-occurrences influences the size of the EC effect has not been determined. Given the high theoretical and practical relevance of this question, it is surprising that several decades of research on EC was not able to provide conclusive answers. The present research addresses this long-standing question while taking into account several moderators that help organize the existing literature and inspire new theorizing about frequency effects in EC. Additionally, to achieve high internal validity, we separate mere exposure effects on ratings from frequency effects in EC. Across four experiments, we demonstrate robust frequency effects in EC procedures that provide a different US at each pairing instance. We discuss the results' consequences for theorizing on EC as well as their practical implications.

**Keywords:**

**Presentation type:** Original Research Talk

**Session:** Frequency, fluency, and evaluative conditioning

## Processing Fluency Effects in Evaluative Conditioning (EC)

Jan R. Landwehr \*

Goethe University Frankfurt

Even though EC paradigms inevitably expose participants repeatedly to stimuli in a manner very similar to mere exposure paradigms, the hedonically positive experience of processing fluency that is considered the underlying mechanism of the mere exposure effect has received little attention in EC research. In this presentation, I will present empirical evidence from seven experimental studies (two published and five unpublished) attesting to the critical role fluency has in understanding EC. The first study (Landwehr et al., 2017) shows that exposure-induced fluency asymmetrically biases EC in that positive EC is augmented and negative EC attenuated. A set of three unpublished studies extends this finding to extinction of EC based on the premise that extinction is procedurally identical to a fluency-inducing mere exposure procedure. These studies show that repeated measurement of fluency and liking trigger asymmetric extinction of negative EC but not of positive EC—in line with a systematic extinction bias due to fluency. Finally, when actively manipulating the perceptual fluency of the conditioned stimuli utilizing color contrast, EC effects for fluent conditioned stimuli are systematically uplifted and the valence effect of the unconditioned stimuli is amplified (Landwehr & Eckmann, 2020; replicated in two further unpublished studies).

### References

Landwehr, J. R. & Eckmann, L. (2020). The nature of processing fluency: Amplification versus hedonic marking. *Journal of Experimental Social Psychology*, 90, 1-14.

<https://doi.org/10.1016/j.jesp.2020.103997>

Landwehr, J. R., Golla, B., & Reber, R. (2017). Processing fluency: An inevitable side effect of evaluative conditioning. *Journal of Experimental Social Psychology*, 70, 124-128.

<https://doi.org/10.1016/j.jesp.2017.01.004>

**Keywords:** Evaluative Conditioning, Processing Fluency, Extinction, Consumer Psychology

**Presentation type:** Original Research Talk

**Session:** Frequency, fluency, and evaluative conditioning

## COGNITIVE MODELING AND CONFLICT TASKS

---

### **Employing the Diffusion Model for Conflict Tasks (DMC) to clarify the influence of target eccentricity on information processing in the visual Simon task**

Ruben Ellinghaus <sup>1\*</sup>, Roman Liepelt <sup>1</sup>, Ian G. Mackenzie <sup>2</sup>, Hartmut Leuthold <sup>2</sup>, Victor Mittelstädt <sup>2</sup>

<sup>1</sup> FernUniversität in Hagen, <sup>2</sup> Universität Tübingen

*Conflict tasks* subsume a variety of experimental paradigms which demonstrate that a task-irrelevant information source can interfere with response selection. For example, the visual *Simon effect* refers to prolonged and more erroneous responses when the task-irrelevant stimulus location is incongruent with the response side. To account for the processes underlying such performance decrements, the *Diffusion Model for Conflict Tasks (DMC)* assumes a superimposed diffusion-decision process that combines activations from time-independent target-based processes and time-varying distractor-based processes. The present study demonstrates the power of applying DMC analyses to better understand the temporal dynamics of conflict processing in the visual Simon task. Specifically, we aimed at clarifying how target eccentricity - one of the task's core parameters – affects processing. Regardless of whether eccentricity was manipulated on a trial-by-trial basis (Experiment 1) or blockwise (Experiment 2), DMC analyses revealed that the increased mean Simon effects with far targets are due to decreases in the rate of target-based evidence accumulation. Furthermore, in Experiment 1, distractor-based activation also increased with far targets, suggesting a relative coding of target locations, such that intermixed locations serve as a reciprocal spatial reference. Thus, target eccentricity can directly impact the strength of both target and distractor processes, rather than solely influencing their temporal overlap – an explanation previously suggested. Overall, the present study shows that DMC analyses help to dissociate the effects of experimental manipulations on different aspects of conflict processing (i.e., strength and timing of target and distractor processing).

**Keywords:** Simon, SRC, Mental Chronometry, Diffusion Model, Mathematical Psychology, Conflict Tasks

**Presentation type:** Original Research Talk

**Session:** Cognitive modeling and conflict tasks

---

## **Accelerated parameter identification and maximum likelihood estimation for diffusion models**

Thomas Richter <sup>1\*</sup>, Markus Janczyk <sup>2</sup>, Valentin Koob <sup>2</sup>

<sup>1</sup> *Otto-von-Guericke Universität Magdeburg*, <sup>2</sup> *Universität Bremen*

Diffusion models are important tools to investigate the processes underlying simple tasks. Common ways to estimate these models leverage the likelihood function (i.e., the probability of the parameters given the data). In this talk, we will present an approach to compute the exact gradients of the diffusion model with time-dependent parameters (as in many conflict task diffusion models), when it is formulated as either a differential or integral equation. Using these exact gradients enables a shift from commonly used derivative-free optimization methods like Nelder-Mead to more efficient gradient-based methods, such as Gradient Descent, BFGS, or Newton's method. These techniques significantly accelerate the parameter identification process. Additionally, they allow for more exact model diagnostics and statistical inference.

**Keywords:**

**Presentation type:** Original Research Talk

**Session:** Cognitive modeling and conflict tasks

---

## Unravelling the effect of physical effort on cognitive control parameters

Leslie Held <sup>1\*</sup>, Marie Van de Walle <sup>1</sup>, Ayala Denul <sup>1</sup>, Alessandro Colosio <sup>2</sup>, Jan Boone <sup>2</sup>, Wim Notebaert <sup>1</sup>

<sup>1</sup> *Department of Experimental Psychology, Ghent University, Ghent, Belgium*, <sup>2</sup> *Department of Movement & Sports Sciences –Exercise Physiology, Ghent University, Ghent, Belgium*

Evidence regarding the effect of physical effort on cognitive performance is mixed, with some studies suggesting improvements, particularly at low to moderate intensities. The variability in findings is partly due to a lack of standardized protocols and the limitations of behavioral measures in capturing cognitive functions at the process level. In this study, we aimed to investigate how physical effort affects control parameters by combining a conflict task with cognitive modeling, administered at established moderate and heavy intensity domains. To this end, thirty-two participants completed the Eriksen flanker task while cycling at 50, 80(90), and 110(130) Watts for females (males), respectively. During the exercise, we measured heart rate, oxygen uptake, blood lactate, and subjective ratings of physical and cognitive fatigue. Mixed-effects models revealed a significant decrease in reaction times with increasing intensity but no effect on accuracy. Interestingly, fitting the diffusion model of conflict (Ulrich et al., 2015) using the DMCFun package (Mackenzie & Dudschig, 2021), indicated this was driven by a linear decrease in boundary separation, an inverted U-shape in the drift rate parameter but not by peak latency or amplitude. This suggests that participants exhibited reduced response caution at higher intensities, an initial improvement in attentional capture followed by a decline, consistent with the Yerkes-Dodson law (1908), but no differences in automatic activation by the distractors across intensities. Together, our findings offer new insights into the exercise-cognition relationship, highlighting the need for more sensitive indicators obtained through the modeling of behavior.

**Keywords:** flanker, conflict, diffusion model, exercise, effort

**Presentation type:** Original Research Talk

**Session:** Cognitive modeling and conflict tasks

## Comparing sequential effects in interference tasks to sequential effects in other domains using cognitive modeling

Anne Voormann <sup>1\*</sup>, Andrea Kiesel <sup>1</sup>, Jeff Miller <sup>2</sup>

<sup>1</sup> University of Freiburg, <sup>2</sup> University of Otago

Sequential modulations are a very robust observation in cognitive tasks. A common finding are sequential effects described by performance gains, faster mean response times (RTs) and higher accuracy, in case of a repetition of two consecutive trials, compared to an alternation. Sequential effects occur, for example, in visual search, two-choice RT tasks, and task-switching. In conflict tasks, sequential modulations are often referred to as congruency sequence effects, describing smaller congruence effects (performance in incongruent trials - performance in congruent trials) after a previous incongruent trial compared to a previous congruent trial. Although congruency sequence effects clearly describe sequential modulations, it is questionable how they relate to sequential effects. To examine a possible relationship between sequential effects in the interference paradigm with sequential effects in the visual search, two-choice RT tasks, and task-switching, we conducted an experiment using methods designed to maximize the similarity of stimuli and responses across paradigms. To allow a thorough comparison of sequential effects across paradigms, we relied on both descriptive (e.g., ex-Gaussian) and process-oriented (e.g., diffusion model) analysis of response time distributions rather than focusing on mean RTs. This helps us to identify both empirical similarities and differences across paradigms.

**Keywords:** sequential effects, cognitive modelling

**Presentation type:** Original Research Talk

**Session:** Cognitive modeling and conflict tasks

## Fitting conflict diffusion models with the R-Package dRiftDM

Valentin Koob <sup>1\*</sup>, Thomas Richter <sup>2</sup>, Rolf Ulrich <sup>3</sup>, Markus Janczyk <sup>1</sup>

<sup>1</sup> *University of Bremen*, <sup>2</sup> *Otto von Guericke University of Magdeburg*, <sup>3</sup> *University of Tübingen*

Using mathematical models of human cognition has become an increasingly important and valuable research tool in many different fields of psychological research and neighboring areas. Widely used are drift diffusion models that can be used to predict probability density functions (PDFs) of binary choice reaction tasks. Often, the parameters of such a model are time-independent (i.e., they do not vary as a function of time within a trial). However, the more common case involves time-dependent parameters, as seen in conflict diffusion models that assume a time-varying drift rate. Such time-dependent (or non-stationary) models increase mathematical complexity, but several solutions to approximate the PDFs have been advanced. We here present dRiftDM, an R package particularly designed to meet the needs of psychological research. This package approximates the PDFs by solving the Kolmogorov-Forward-Equation to handle time-dependent models as well. Fitting a model to data can be done participant-wise, and model parameters and statistics are easily accessible and can be visualized directly to provide information about (qualitative) model fits.

**Keywords:** diffusion model, R package

**Presentation type:** Original Research Talk

**Session:** Cognitive modeling and conflict tasks



# FROM BEHAVIORAL EYE-TRACKING ANALYSIS TO COGNITIVE IMAGING: MECHANISMS OF ATTENTION AND LEARNING IN SEARCH TASKS

---

## Statistical learning of target-distractor co-occurrences in human participants' visual-search scanning patterns

Thomas Geyer \*, Werner Seitz

*Department of Psychology, University of Munich*

The contextual cueing paradigm has generated considerable interest in cognitive neuroscience to understand how human participants exploit statistical target-distractor co-occurrences in visual search tasks. According to one account, contextual repetitions lead to the acquisition of spatial, or, contextual, long-term memories (LTM) that lead to more efficient guidance, or 'cueing', of attention to the searched-for target location in recurring displays. However, guidance of search from display-specific LTMs has been shown only with aggregated, e.g., reaction times, fixation number, attention measures.

Because of this, in recent investigations, we have analyzed fixational patterns in individual old-context displays. We find high similarity in visual scanning across participants when these participants nevertheless viewed differently composed old-context displays (with different target positions and distractor compositions). Our results suggest an account according to which contextual repetitions lead to the acquisition of a skill, or procedural knowledge, about how to perform visual search more effectively across the entire set of the repeated displays. Consequently, different types of 'learning-that' versus 'learning-how' seem to contribute to search facilitation in repeated search arrays.

**Keywords:** Contextual Cueing, Selective Attention, Scanpath Theory, Visual Search, Procedural Learning, Statistical Learning

**Presentation type:** Original Research Talk

**Session:** From behavioral eye-tracking analysis to cognitive imaging: Mechanisms of attention and learning in search tasks

## Contextual cueing in the auditory modality

Ananya Mandal <sup>1\*</sup>, Heinrich Liesefeld <sup>2</sup>, Thomas Geyer <sup>1</sup>, Artyom Zinchenko <sup>1</sup>

<sup>1</sup> *Ludwig-Maximilians-Universität München*, <sup>2</sup> *Universität Bremen*

Although contextual cueing (CC) has been extensively studied in visual tasks, it remains unexplored in the auditory modality. To address this, we developed a novel paradigm, which for the first time convincingly demonstrates the CC effect in the auditory modality. Here, each trial consisted of a sequence of spatially presented auditory stimuli and participants responded to a target (number 4 or 5) presented amongst distractor stimuli (letters from the English alphabet). The trials in a block were either repeated (invariant distractors) or non-repeated (random distractors), with faster reaction times to repeated trials representing a CC effect. Across a series of experiments that systematically manipulated various aspects of the distractors (locations, order, or identities), we demonstrate a robust auditory CC effect that can be effectively distinguished from sequence learning. Along with extending CC to the auditory modality, this paradigm also opens up new possibilities of research on statistical learning in multisensory environments.

**Keywords:** auditory contextual cueing, statistical learning, auditory attention

**Presentation type:** Original Research Talk

**Session:** From behavioral eye-tracking analysis to cognitive imaging: Mechanisms of attention and learning in search tasks

---

## Neural and behavioral evidence of within- and cross-dimension visual distractor suppression

Fredrik Allenmark <sup>1\*</sup>, Bei Zhang <sup>1, 2</sup>, Milos Stankovic <sup>1, 3</sup>, Hermann Müller <sup>1</sup>, Zhuanghua Shi <sup>1</sup>

<sup>1</sup> *General and Experimental Psychology, Department of Psychology, Ludwig Maximilian University of Munich*, <sup>2</sup> *Institute of Science and Technology for Brain-Inspired Intelligence, Fudan University*, <sup>3</sup> *Department of Psychiatry and Psychotherapy, University of Regensburg*

Salient distractors can capture attention and disrupt tasks. This talk presents recent studies on how the brain suppresses visual distractors, whether they are within the same dimension as the target (within-dimension) or in a different one (cross-dimension). Using fMRI with the additional singleton visual search paradigm, we identified distinct neural processes for suppressing these distractors. Suppression of same-dimensional distractors occurs early, as indicated by reduced activity in the early visual cortex. In contrast, ignoring cross-dimensional color distractors involves higher brain regions like the fusiform gyrus. Further studies indicated that, at least for within-dimension distractors, the suppression is relatively local. That is, only the locations where the distractor has frequently appeared in the past are influenced by the learned distractor suppression, while distractors appearing in other locations are relatively unaffected. Additionally, using eye-tracking and a go/no-go task, to explore attentional capture after a response (or a no-go) decision has been reached, we show that distractor suppression can be flexibly activated and deactivated depending on current task requirements. Suppression remains active while performing a search task, but is deactivated during task-free exploration.

**Keywords:** visual search, visual attention, statistical learning, distractor suppression

**Presentation type:** Original Research Talk

**Session:** From behavioral eye-tracking analysis to cognitive imaging: Mechanisms of attention and learning in search tasks

## Statistical learning in visual search inside and outside the initial field of view

Artyom Zinchenko <sup>1\*</sup>, Ananya Mandal <sup>1</sup>, Heinrich Liesefeld <sup>2</sup>, Daniel Weinert <sup>1</sup>, Thomas Geyer <sup>1</sup>

<sup>1</sup> LMU, Munich, <sup>2</sup> University of Bremen, Bremen

While contextual cueing (the ability to learn and remember visual patterns) has been extensively studied in 2D environments, little is known about how it works in 3D virtual reality (VR) settings. To investigate this, we developed a new VR experiment that tested how people find targets both within their immediate view and in the surrounding environment. Across two experiments, we found strong contextual cueing effects in 3D environments. Participants responded faster to repeated configurations, whether targets were within or outside their initial view. We discovered that people tend to scan 3D environments from left to right, which affected how they adapted when we moved targets to new locations. Importantly, participants remained faster at finding targets in familiar displays even after we relocated them, particularly when the new locations matched target positions from other learned displays. Our head-tracking measurements confirmed that participants developed more efficient search patterns in familiar contexts. These findings show how contextual cueing works in realistic 3D environments, demonstrating that repeated exposure helps people develop more efficient visual search strategies.

**Keywords:** Contextual cueing, VR, initial field of view, relearning

**Presentation type:** Original Research Talk

**Session:** From behavioral eye-tracking analysis to cognitive imaging: Mechanisms of attention and learning in search tasks

## **Context-based guidance vs. context suppression in contextual learning: role of un-/certainty in the target-context relations in visual search**

Siyi Chen \*, Fredrik Allenmark , Hermann Müller , Zhuanghua Shi

*Ludwig-Maximilians-Universität München, 80802 München, Germany*

Standard investigations of contextual facilitation typically employ invariant distractor arrangements predicting a fixed target location. In the real world, though, invariant spatial contexts are not always predictive. This talk presents recent studies on how facilitation is influenced by un-/certainty in the prediction of the target location. Using behavioral modeling and eye-tracking methods, we examined how uncertainty in target locations, context-target relations, and display types influence contextual learning. Our findings reveal that different modes of contextual learning, such as contextual guidance and context suppression, are influenced by the probability of these predictions. Specifically, we demonstrate that only when the context-target relationship is fully predictable does the brain engage in contextual guidance, while any disruption in this predictability triggers context suppression instead. How these modes may be implemented in a neural-network model of visual search is discussed, offering important insights into the mechanisms underlying long-term contextual learning in visual search.

**Keywords:** contextual cueing; eye tracking; visual search; context-based guidance; context suppression

**Presentation type:** Original Research Talk

**Session:** From behavioral eye-tracking analysis to cognitive imaging: Mechanisms of attention and learning in search tasks

## METACOGNITION AND METAMEMORY I

---

### Metacognitive, but not cognitive feedback remedies illusions in judgments of learning

Sofia Navarro-Báez <sup>1\*</sup>, Arndt Bröder <sup>2</sup>, Monika Undorf <sup>1</sup>

<sup>1</sup> *Technical University of Darmstadt*, <sup>2</sup> *University of Mannheim*

Illusions in judgments of learning (JOLs), predictions of future memory, occur when people base their JOLs on invalid cues or fail to consider cues that are predictive of actual memory performance. Several illusions have been reported (e.g., font size illusion, stability bias), but there is currently no established method to correct them. In this study, we tested the effectiveness of different forms of feedback in mending illusions. In each of three experiments, participants completed three study-test cycles in which they studied three different study lists. Participants made JOLs and received feedback or no feedback after each cycle. In Experiments 1 and 2, cognitive feedback on one's own recall performance and JOL for each studied item was provided. In Experiment 3, additional metacognitive feedback informed learners about possible metacognitions during learning, their biased nature, and ways to enhance JOL accuracy. Results showed that cognitive feedback was not effective for mending the font size illusion (Experiments 1 and 2), the stability bias (Experiment 1), or the font format illusion (Experiment 2). In contrast, metacognitive feedback remedied the stability bias and in turn improved relative JOL accuracy (Experiment 3). In conclusion, this study shows that cognitive feedback alone at the item level is not enough for improving the cue basis and relative accuracy of JOLs. Rather, metacognitive feedback consisting of an in-depth explanation of biased metacognition is required.

**Keywords:** Metamemory, Judgments of Learning, JOLs, Metacognition, Metamemory Illusions

**Presentation type:** Original Research Talk

**Session:** Metacognition and metamemory I

---

## Modeling the relationship between metamemory judgments and latent memory processes using Bayesian hierarchical MPT models

Franziska M. Leipold \*, Arndt Bröder , Martin Schnuerch

*University of Mannheim*

In the study of metamemory monitoring, it is common to make assumptions about how predictions of future memory performance (metamemory judgments) relate to latent memory processes. In practice, however, most research in this area focuses on empirical measures of memory performance rather than directly linking metamemory judgments to underlying latent processes. One modeling approach that allows for the measurement of latent (memory) processes is multinomial processing tree (MPT) modeling. However, linking continuous metamemory judgments to latent MPT parameters is not straightforward. Previously, this has been achieved by Vincentizing (binning) continuous judgments and relating them to aggregate-level MPT parameters. While this represents a significant step forward, it results in a substantial loss of information and prevents the analysis of individual differences in these relations. Therefore, we propose a novel approach using Bayesian hierarchical MPT models in which continuous metamemory judgments are directly included as trial-level predictors of person-wise latent model parameters. We compare this approach to the Vincentization method in a simulation study and by applying it to published data on the relationship between judgments of learning (JOLs) and latent familiarity- and recollection-based memory processes.

**Keywords:** Metamemory, MPT-Modeling, Bayesian Hierarchical Modeling, Vincentization, Judgments of Learning

**Presentation type:** Original Research Talk

**Session:** Metacognition and metamemory I

---

## How Accurate are People at Predicting their Memory for Context?

Désirée N. Schönung \*, Rica Zühlke , Vivienne N. Haag , Beatrice G. Kuhlmann

*University of Mannheim*

Metamemory research so far has mainly focused on people's ability to predict their item memory, for example what was said. However, it is also a useful skill to predict one's source memory, for example the speaker. The aim of this study is to assess the relative accuracy of Judgements of Source (JOS) using multinomial processing tree (MPT) modeling, which provides a measure of source memory independent of item memory and corrected for the influences of guessing, allowing a better assessment of the relationship between source memory and JOS. We will report results from three experiments conducted in parallel (with random assignment). A total of 90 participants ( $n = 30$  per experiment) study words and sources in the three classical source monitoring tasks. Participants either hear the words read out by two speakers (external), imagine themselves or a famous person saying the words (internal) or the combination – listening to one speaker or imagining themselves saying the word (reality-monitoring). Items will be vincentized into bins of different JOS level and aggregated over participants. The two-high-threshold model of source monitoring (2HTSM) will be used to estimate source memory parameters for each JOS level. We hypothesize that source memory  $d'$  increases with increasing JOS level.

**Keywords:** Judgements of Source, metamemory, episodic memory, multinomial modeling

**Presentation type:** Original Research Talk

**Session:** Metacognition and metamemory I

## Metacognition of variable retrieval

Katarzyna Zawadzka <sup>1\*</sup>, Ewa Butowska-Buczyńska <sup>2</sup>, Maciej Hanczakowski <sup>1</sup>

<sup>1</sup> Adam Mickiewicz University, <sup>2</sup> SWPS University

When presented with some information multiple times, people learn it more effectively when engaging in retrieval practice in a variable rather than constant manner. However, they believe constant learning to be more beneficial. We thus aimed at helping participants appreciate the benefits of varied learning. Using foreign word translations as study materials, we had participants complete two study-test blocks with half of the translations presented in a varied manner, and half in a constant manner. We asked for global predictions of performance before each test, and for global postdictions after each test. Study and test experience did not alleviate the preference for constant learning, and neither did instructions explaining the benefits of varied learning inserted in between the blocks. Item-by-item performance feedback on the first test, however, managed to help



participants appreciate the benefits of varied retrieval practice. This underscores the effectiveness of item-by-item strategy comparisons for mending metacognitive errors.

**Keywords:** memory, metamemory, learning strategies

**Presentation type:** Original Research Talk

**Session:** Metacognition and metamemory I

---

## Metamemory Control in Schema-Based Source Monitoring: Improving Memory for Expected Sources

Marie Luisa Schaper \*, Carolin V. Hey , Ute J. Bayen

*Heinrich Heine University Düsseldorf*

Source memory is typically better when a piece of information is schematically unexpected for its source (e.g., microwave in a bathroom) than when it is expected (e.g., microwave in a kitchen, e.g., Schaper et al., 2019). This inconsistency effect is explained by enhanced attention to unexpected source-item pairs which improves encoding (e.g., Küppers & Bayen, 2014). In metamemory, however, people show an expectancy illusion: They incorrectly predict better source memory for expected source-item pairs and neglect these during study (Schaper & Bayen, 2021). We aimed to improve memory for expected sources by remedying the expectancy illusion and improving metamemory control. Two participant groups (n = 72 each) completed a source-monitoring experiment with expected and unexpected source-item pairs. Participants in the remedy group experienced the inconsistency effect during a first study-test cycle. This remedied their expectancy illusion. For a second study phase (self-paced, new materials), they were instructed to focus their attention on the expected source-item pairs. Finally, they completed a second source-monitoring test. The control group completed only one self-paced study phase and one source-monitoring test without further study instruction. Control participants studied unexpected pairs longer than expected pairs and showed the typical inconsistency effect on source memory. By contrast, in the second study-test cycle of the remedy group, study time was equal for expected and unexpected pairs, as was source memory. Metamemory control, when effectively executed, can improve memory for expected sources.

**Keywords:**

**Presentation type:** Original Research Talk

**Session:** Metacognition and metamemory I

## METACOGNITION AND METAMEMORY II

---

### Metacognitive aspects of insight problem solving

Amory Danek \*

*Heidelberg University*

The ability to find creative solutions to difficult problems is a hallmark of intelligent behaviour in humans. New ideas often emerge as sudden insights, after a fundamental change in the way the problem is approached. Typically, problem solvers do not have full conscious access to this restructuring process, being unable to report their thinking steps or monitor their progress (Metcalf & Wiebe, 1987). Instead, they are left with the impression that the solution appeared out of the blue (Stuyck et al., 2021). But they can report accompanying emotions, often of a positive nature – the so-called “Aha! experience” (Wiley & Danek, 2024). This talk discusses the question of whether metacognitive monitoring is possible in insight problem solving. This approach requires abandoning the notion of insight as a somewhat mysterious phenomenon and focusing on what can be monitored. I will review potential metacognitive judgements to assess insight problem solving and how accurate those judgements are. Further, I will discuss currently available methods to study a partly subconscious process such as restructuring of the problem representation.

Wiley, J., & Danek, A. H. (2024). Restructuring processes and Aha! experiences in insight problem solving. *Nature Reviews Psychology*, 3, 42–55.

Metcalf, J., & Wiebe, D. (1987). Intuition in insight and noninsight problem solving. *Memory & Cognition*, 15, 238–246.

Stuyck, H., Aben, B., Cleeremans, A., & Van den Bussche, E. (2021). The Aha! moment: Is insight a different form of problem solving? *Consciousness and Cognition*, 90, 103055.

**Keywords:** insight, problem solving, Aha! experience, metacognition

**Presentation type:** Original Research Talk

**Session:** Metacognition and metamemory II

---

## Using metacognition to examine age-related changes in memory retrieval

Maciej Hanczakowski <sup>1\*</sup>, Oliwia Zaborowska <sup>2</sup>, Beatrice Kuhlmann <sup>3</sup>, Nikoletta Symeonidou <sup>3</sup>,  
Katarzyna Zawadzka <sup>1</sup>

<sup>1</sup> Adam Mickiewicz University, <sup>2</sup> SWPS University, <sup>3</sup> Universität Mannheim

What we know about memory in general, and age-related decline in memory in particular, almost always comes from various explicit memory tests. However, memory is often expressed outside of testing situations, without deliberate attempts to retrieve information from memory. This spontaneous form of memory retrieval, referred to as reminding, can be measured by its effect on metacognitive judgments such as judgments of learning (JOLs). Here we investigated whether such a metacognitive measure would reveal the often described age-related impairment in contextual memory. In two experiments, we compared the effects of reinstating the original encoding context at restudy on JOLs rendered by young and older adults. In Experiment 1, using arbitrary contexts, we documented reduced effects of context reinstatement for older adults, suggesting impaired context-induced reminding with aging. In Experiment 2, using contexts semantically related to memoranda, we documented exacerbated effects of context reinstatement for older adults, suggesting intact context-induced reminding with aging. These results indicate that older adults are capable of using context information to support reminding – and thus influence metacognition outside of memory tests – but only when encoding of context is facilitated by schematic support.

**Keywords:** memory; context; aging

**Presentation type:** Original Research Talk

**Session:** Metacognition and metamemory II

---

## Judgments of Learning Modify Memory Regardless of the Response Format or Response Scale

Monika Undorf <sup>1\*</sup>, Yael Meer <sup>2</sup>, Vered Halamish <sup>2</sup>

<sup>1</sup> *Technical University of Darmstadt*, <sup>2</sup> *Bar-Ilan University*

In metamemory research, it is commonly assumed that learners spontaneously monitor their learning progress. To assess monitoring, participants are asked to provide judgments of learning (JOLs) as they memorize information, usually on a percentage scale. Recent evidence that making JOLs has a reactive effect on memory performance, however, suggests that the processes involved in spontaneous monitoring are different from those that are involved when participants are requested to make and report JOLs. The present research examined two hypotheses regarding the difference between spontaneous monitoring and making JOLs. According to the overt-response hypothesis, JOL reactivity emerges from the requirement to report the JOLs that are spontaneously done covertly. To test this hypothesis, participants studied related and unrelated word pairs and made JOLs either overtly or covertly or did not make any JOLs. According to the numerical-response hypothesis, JOL reactivity emerges from the requirement to translate qualitative, non-numerical spontaneous assessments of learning into numerical JOLs. To test this hypothesis, participants made overt JOLs on a percentage scale, a Likert scale, a yes/no scale, or did not make JOLs. The results yielded JOL reactivity regardless of the response format or the response scale except when participants were under-engaged in making covert JOLs. These findings are inconsistent with both hypotheses and allude instead to the possibility that JOL reactivity emerges when monitoring does not spontaneously occur and is initiated by the JOL prompt.

**Keywords:** judgments of learning, metacognition, memory, reactivity, response format and scale

**Presentation type:** Original Research Talk

**Session:** Metacognition and metamemory II

## Selected Findings From a Meta-Analysis on Reactivity to Immediate Judgments of Learning

Franziska Ingendahl <sup>1\*</sup>, Vered Halamish <sup>2</sup>, Monika Undorf <sup>1</sup>

<sup>1</sup> *Technical University of Darmstadt, Germany*, <sup>2</sup> *Bar-Ilan University, Israel*

Immediate judgments of learning (JOLs), predictions of one's future memory performance during learning, are often used to investigate how people monitor their learning and memory. Previous research on immediate JOL reactivity shows that soliciting immediate JOLs can change memory. It is not well-understood, however, under which conditions making JOLs improves, impairs, or does not affect memory, and which processes contribute to JOL reactivity. The present study provides a comprehensive meta-analysis of immediate JOL reactivity based on 344 effect sizes from 175 experiments reported in 49 records with a sample of 15,079 adults. Overall, making JOLs improved memory performance ( $g = 0.22$ , 95% CI [0.17, 0.27]). While the subset of effect sizes based on related and unrelated word pairs yielded virtually identical results overall ( $g = 0.23$ ), examining related and unrelated pairs separately revealed that JOL reactivity differed considerably depending on relatedness: Related pairs revealed positive reactivity ( $g = 0.44$ ), whereas unrelated pairs revealed negative reactivity ( $g = -0.09$ ). Moderator analyses indicated that the size and direction of JOL reactivity varied depending on experimental characteristics, such as memory tests, manipulating making JOLs within or between participants, or the language in which experiments were conducted. Further, results revealed a strong publication bias favoring positive reactivity over negative reactivity. This study confirms that making JOLs can alter memory but also highlights that JOL reactivity is diverse in size and direction. New theories are needed for explaining when and why making JOLs has positive or negative effects on memory performance.

**Keywords:** metamemory, metacognition, memory, judgment of learning (JOL), reactivity, meta-analysis

**Presentation type:** Original Research Talk

**Session:** Metacognition and metamemory II

## Dynamic Cue Integration in Judgments of Learning

Luisa Schulz <sup>1\*</sup>, Arndt Bröder <sup>1</sup>, Monika Undorf <sup>2</sup>

<sup>1</sup> *University of Mannheim*, <sup>2</sup> *Technical University of Darmstadt*

When individuals try to predict their future memory performance, they do not have direct access to it. Instead, they rely on probabilistic cues. Previous research suggests that when people form judgments of learning (JOLs) and multiple cues are available, they integrate them in a compensatory manner rather than focusing on a single cue. However, past experiments, which aggregate data from multiple trials, do not allow to address potential dynamic changes in cue usage. Our study introduces a new experimental design where one cue (the context cue) remains constant across sequences of trials, while another cue (the target cue) changes randomly from trial to trial. We investigate whether the number of trials since the last context cue switch influences how both cues affect JOLs. Our findings reveal that the influence of the context cue decreases over successive trials when it remains constant. In our first experiment, we found no interaction between the target cue and the number of trials since the last context cue switch. This study supports the idea that people use multiple cues when judging their future memory performance and shows that there are dynamic changes in cue influence over time.

**Keywords:** metamemory, metacognition, judgments of learning, memory, cue integration

**Presentation type:** Original Research Talk

**Session:** Metacognition and metamemory II

## SOURCE MEMORY

---

### Sleep Benefits to Source Memory in Older Adults

Beatrice G. Kuhlmann \*, Lucie A. Schicker , Sabrina Shakoor , Edgar Erdfelder

*University of Mannheim*

It is well established that sleep benefits memory. More specifically, and less well tested, theories of sleep and memory (e.g., active systems consolidation theory) predict a particular benefit of (slow wave) sleep to source memory over other non-hippocampal forms of memory. In recent studies with younger adults, we showed that sleep indeed particularly benefitted source memory, more so than item memory (Berres et al., 2024). Using the same design, we randomly assigned 58 older adults (aged 60 – 86 years) to study object pictures in left versus right screen locations either in the morning (7-10am; wake group) or in the evening (7-10pm; sleep group). A test for both item (pictures) and source (location) memory followed 12 hours later (i.e., wake group: same day evening; sleep group: next morning). Multinomial model-based analyses showed that both item and, especially, source memory were significantly improved in the sleep group, with comparable sleep benefits as observed in younger adults. Additionally, older adults in the sleep group wore FitBit™ wristbands for sleep tracking and based on an extended sample of  $N = 67$  in this group we estimated correlations in a Bayesian-hierarchical multinomial analysis. Contrary to expectations, time spent in slow wave sleep did not predict source memory the next morning, but time spent in slow wave sleep embedded in sleep cycles positively predicted source memory. Further, time spent awake after sleep onset, which should disrupt hippocampal replay, negatively predicted source memory the next morning.

**Keywords:** long-term memory, episodic memory, source memory, source monitoring, multinomial modeling, cognitive aging

**Presentation type:** Original Research Talk

**Session:** Source memory

## **Who is the nice guy? Can we genuinely remember relevant interaction partners better, or has previous research only demonstrated improved visual memory?**

Meike Kroneisen \*

*Rheinland-Pfälzische Technische Universität Kaiserslautern-Landau*

Our memory has evolved not only to guide our future decisions but also to prepare us for interactions with the environment, including the social domain. Previous research has demonstrated that mutual cooperation relies on (source) memory. However, the hypothesis of a highly specialized cheater detection module, designed to identify uncooperative individuals, lacks empirical support. Instead, the literature suggests the flexible use of cross-domain inference and source memory mechanisms, which help to predict the future behavior of others by considering both situational and person-specific factors.

Nevertheless, typical research designs have used the same visual material in both the learning and test phases, raising questions about the validity of the results when more realistic materials are used. To address this, the lack of realism was manipulated in various experiments. I discuss the theoretical implications of these findings in relation to the mechanisms underlying source memory for social interaction partners.

**Keywords:** source memory

**Presentation type:** Original Research Talk

**Session:** Source memory

---



## The timing of fact-checking feedback and its consequences for underlying memory processes

Lena Nadarevic <sup>1, 2\*</sup>, Lisa Fazio <sup>3</sup>

<sup>1</sup> *Charlotte Fresenius Hochschule*, <sup>2</sup> *Universität Mannheim*, <sup>3</sup> *Vanderbilt University*

In an age of misinformation, it is crucial to consider how to present the outcome of fact checks for headlines and social media posts. Brashier et al. (2021) found that participants were better at discriminating between true and false headlines when the result of a fact check had appeared after, rather than during or before the respective headline in a prior study phase. However, it remains unclear which cognitive processes underlie this effect. In a conceptual replication study, we addressed this question by displaying fact-check information (“true” vs. “false” vs. “not checked”) to product statements either before or after each statement (“before group” vs. “after group”). Data from a subsequent memory test were analyzed with a multinomial source memory model, which allows disentangling memory for statements, memory for fact-check information, and different guessing processes. A comparison of parameter estimates revealed better memory for both statements and fact-check information in the “after group” compared to the “before group”. This data pattern aligns with a levels-of-processing explanation as well as an impaired-binding explanation. In other words, it seems plausible that providing veracity information prior to a statement leads to less elaborative processing of the statement and at the same time impairs the binding of the veracity information to the statement.

**Keywords:**

**Presentation type:** Original Research Talk

**Session:** Source memory

## Is Truth Important by Default? Enhanced Joint Retrieval Memory for “True” and “Important” Feedback

Daria Ford <sup>1\*</sup>, Marek Nieznański <sup>2</sup>

<sup>1</sup> University of Mannheim, <sup>2</sup> Cardinal Stefan Wyszyński University in Warsaw

Memory research often shows better feedback memory for true information than false (the effect of truth). We can find analogical effects for important compared with unimportant information on item and source/feedback memory (the effect of value). A recently found interaction between information veracity and importance indicates that people effectively prioritize encoding true feedback but not false. However, no study to date has simultaneously provided feedback on both statements' veracity and importance. Therefore, whether the veracity and importance feedback is integrated into joint memory representation remains unclear. We answered this question using a multidimensional source memory multinomial model in the following experiment. Students (N = 82) memorized trivia statements along with their veracity and importance status which resulted in four different combinations of feedback types (true and important, true and unimportant, false and important, false and unimportant). The analysis revealed that the joint retrieval of “true” and “important” feedback as compound information is better than for all other combinations. Moreover, the veracity dimension was memorized better than the importance dimension, showing that we remember whether information is true or false better than whether it is important or unimportant. These results strengthen and expand previous findings on the interaction between veracity and importance, showing that true and important information creates a joint memory representation. This suggests that truth may be perceived as important by default.

**Keywords:** source memory, memory for truth and falsity, value-directed remembering, binding contextual information

**Presentation type:** Original Research Talk

**Session:** Source memory

## **"Memorize the source!" — Do instructions that guide learners' attention to sources improve source memory without impairing learning?**

Oktay Ülker \*, Daniel Bodemer

*University of Duisburg-Essen*

Source memory (i.e., remembering who said what) can improve academic help-seeking: after learning collaboratively, accurate source memory helps learners to identify whom to approach for more information. Research suggests that explicit instructions to remember the source (a source-related task) can improve source memory, yet this can sometimes come at the cost of impaired memory for the content itself (known as item-source tradeoff). This study investigates the effects of source-related tasks, content-related tasks, or their combination on source memory and content-learning. We conducted an experimental pseudo-collaborative study (N = 112) using a 2 (source-related task: with vs. without) × 2 (content-related task: with vs. without) between-subjects design. Participants received information from three learning partners with different knowledge levels regarding the learning topic (high vs. medium vs. low). Source memory was analyzed complementarily with multinomial processing tree models and conditional source identification measures. Contrary to the item-source tradeoff hypothesis, there was a positive correlation between source memory and content-learning. Neither instruction type affected overall source memory or content-learning. However, different patterns for individual learning partners emerged: with a content-related task, source memory was better for high-knowledge partners than low-knowledge partners, while this pattern was descriptively reversed for content-learning. Additionally, a source-related task led to higher mental load. While the tasks did not significantly improve source memory, the positive correlation indicates that enhancing source memory through other methods can be beneficial for knowledge acquisition as well, ultimately benefiting learners in content-learning and long-term academic help-seeking.

**Keywords:** source memory, item-source tradeoff, collaborative learning, multinomial processing tree model

**Presentation type:** Original Research Talk

**Session:** Source memory

## DO YOU REMEMBER? CURRENT TOPICS IN EXPERIMENTAL MEMORY RESEARCH

---

### **Forget me not: Once to-be-remembered items are not forgotten if later instructed to be**

Ryan Hackländer \*, Helge Schlüter , Christina Bermeitinger

*Universität Hildesheim*

Research using the item-method directed forgetting paradigm has consistently shown that instructing a subject to forget an item tends to make it more difficult for that item to be retrieved. Two general theoretical accounts have been proposed to account for this phenomenon, passive accounts which explain forgetting as a function of a discontinuation of resources invested in to-be-forgotten items, and active accounts, which explain forgetting as a function of resources deployed in service of decreasing activation of the to-be-forgotten item. In the current research we aimed at distinguishing between these accounts by presenting some items a single time, with a single instruction, and some items multiple times, with conflicting instructions. Across two experiments, we found evidence that presenting items with conflicting instructions (one remember and one forget) did not lead to worse memory for items than presenting them a single time with a remember instruction. Our findings are generally at odds with current active accounts of directed forgetting.

**Keywords:** Memory, Forgetting, Directed Forgetting

**Presentation type:** Original Research Talk

**Session:** Do you remember? Current topics in experimental memory research

---

## The many meanings of memory updating – How prediction errors influence memory representations

Marius Boeltzig <sup>1, 2\*</sup>, Nina Liedtke <sup>1</sup>, Ricarda Schubotz <sup>1</sup>

<sup>1</sup> University of Münster, <sup>2</sup> Lund University

According to the predictive coding framework, the brain automatically makes predictions about what is going to happen next. When predictions are incorrect, a prediction error (PE) arises, which is associated to memory updating. This may consist of encoding of the unexpected information as well as weakening of the original memory which the prediction was based on. However, it remains unclear when and how these similar memories can coexist.

In a five-session experiment, participants listened to naturalistic dialogues, which were encoded in an original form and later modified, inducing a PE. The modifications were either on the surface level, changing only the phrasing, or on a gist level, changing the overall meaning. Participants were then tested on original and modification recognition memory.

Both the originals and modifications were recognized best after higher-rated gist changes compared to smaller gist changes. For surface changes, the magnitude of modification had no effect. This is consistent with previous results and computational frameworks in that bigger PEs, induced by strong gist changes, lead to the encoding of a separate memory trace.

Using representational similarity analysis, we investigated whether original and modified dialogues are represented more distinctly (pattern separation) or similarly (memory integration). Results suggest that the two coding schemes are employed to differing extents, depending on PE size and quality. Whether these similar memories are integrated or separated can then have an impact on memory. Our results highlight that PEs can have several different outcomes and help to understand which circumstances lead to them.

**Keywords:** episodic memory, prediction error, memory updating

**Presentation type:** Original Research Talk

**Session:** Do you remember? Current topics in experimental memory research

## Effects of testing on memory for central and contextual information

Simone Malejka \*, Gina Lietz

*University of Cologne*

Research in psychology has repeatedly shown that interim tests lead to better performance on a final test than restudying the same information—a finding known as the *testing effect* (also *retrieval-practice effect*). However, widespread use of interim tests in educational settings has been hindered due to a lack of their theoretical understanding. The episodic-context account (Karpicke et al., 2014) states that tests promote learning of new associations between the learning material and the learning context, thereby strengthening memory for the contextual aspects of the tested episode. The rapid-consolidation hypothesis (Antony et al., 2017) states that tests accelerate integration of the tested episode into preexisting knowledge, resulting in a more permanent and context-free memory representation. Hence, both accounts make opposing predictions regarding how well contextual aspects should be remembered. In order to investigate whether tests improve or impair context memory, participants watched a video of a theft once (control group), twice (restudy group), or once followed by forced-choice questions about the scene (test group). Two days later, all participants answered the forced-choice questions, which concerned the perpetrator (central information) and several details of the event (contextual information). The final-test results showed that (a) central and contextual information were remembered better after testing than restudying and (b) the accuracy for central and contextual information were positively correlated. The findings are discussed in light of the most popular theories of the testing effect.

**Keywords:** testing effect, retrieval practice, episodic memory, context memory

**Presentation type:** Original Research Talk

**Session:** Do you remember? Current topics in experimental memory research

## **Repeated guesses during learning can improve memory – even if they are wrong**

Oliver Kliegl <sup>\*</sup>, Johannes Bartl , Karl-Heinz T. Bäuml

*Regensburg University*

Taking a test on material that has not yet been studied can improve long-term retention of the material even when the initial guess is wrong. In the present study, we used weakly associated word pairs (Experiments 1 and 3), Swahili–German word pairs (Experiment 2), and prose passages (Experiment 4) as study material to examine whether this pretesting effect is modulated in magnitude when pretests are repeatedly administered during learning. Results of Experiments 1-4 consistently showed the typical pretesting effect, with improved recall performance after a single guessing attempt relative to the study-only baseline. Critically, the pretesting effect increased in size when multiple guessing attempts were made during learning, regardless of whether the duration of the pretesting phase increased with the number of guesses (Experiments 1, 2, and 4) or was held constant (Experiment 3). Taken together, the results show that additional guessing can promote access to the pretested material on the final test and suggest that in educational contexts, extensive pretesting during acquisition can serve as an effective learning strategy.

**Keywords:** episodic memory, testing effects, learning from errors, elaboration

**Presentation type:** Original Research Talk

**Session:** Do you remember? Current topics in experimental memory research

## **Voluntary forgetting supports memory updating – But maybe not with prolonged retention intervals after initial encoding**

Magdalena Abel <sup>1\*</sup>, Anna Nickl <sup>2</sup>, Karl-Heinz Bäuml <sup>2</sup>

<sup>1</sup> *University of Technology Nuremberg*, <sup>2</sup> *University of Regensburg*

Prior work on list-method directed forgetting (LMDF) has shown that instructions to forget previously encoded material are highly effective and can support memory updating. Forgetting instructions are however usually presented immediately after encoding of to-be-forgotten information. It is currently unclear if voluntary forgetting can also support updating when information was encoded some time ago and, arguably, already stabilized in memory. Two experiments applied the typical LMDF task to address this gap in the literature. Participants studied two lists of unrelated items and, between lists, received instructions to either remember or forget the first list. Critically, the retention interval after list-1 and before list-2 encoding was varied, with participants receiving remember or forgetting instructions after shorter retention intervals (0-20 min) or after a prolonged retention interval (24 hrs). The results showed intact voluntary forgetting after the shorter retention intervals, but not after a prolonged retention interval of 24 hrs. This suggests that it may be harder to forget information that was already stabilized in memory. Prolonged retention intervals could thus act as a boundary condition for effective memory updating in the form of LMDF.

**Keywords:** memory, voluntary forgetting, list-method directed forgetting, memory updating

**Presentation type:** Original Research Talk

**Session:** Do you remember? Current topics in experimental memory research



# DISSOCIATING EFFECTS OF EPISODIC RETRIEVAL OF RECENT STIMULUS-RESPONSE EPISODES VERSUS CONTINGENCY AWARENESS AS A SOURCE OF LEARNING

---

## Stimulus-response binding and retrieval processes operate independently of contingency awareness

Matthäus Rudolph <sup>1\*</sup>, Carina Giesen <sup>2</sup>, Klaus Rothermund <sup>1</sup>

<sup>1</sup> *Friedrich-Schiller University Jena*, <sup>2</sup> *Health and Medical University Erfurt*

Stimulus-response binding and retrieval (SRBR) is a fundamental mechanism facilitating behavior automatization. The binding and retrieval in action control framework (BRAC; Frings et al., 2020) proposes that SRBR is subject to modulation by top-down processes, such as awareness and instruction-based learning. Yet, the empirical findings regarding this conjunction are scattered and unsystematic. In a mega-analysis, we analyzed the data of four contingency learning experiments ( $N_{total} = 859$ ) to investigate the modulatory role of contingency awareness on SRBR effects. In two of these experiments, participants received explicit instructions about the contingencies. Our findings suggest that SRBR effects operate independently of contingency awareness, as (a) participants' contingency awareness did not modulate SRBR effects, and (b) SRBR effects were not modulated by experimental manipulations of contingency knowledge (instructed contingencies).

**Keywords:** episodic binding and retrieval, contingency awareness, contingency learning

**Presentation type:** Original Research Talk

**Session:** Dissociating effects of episodic retrieval of recent stimulus-response episodes versus contingency awareness as a source of learning

## **Stimulus-response binding and retrieval is independent of affective consequences**

Anna Martini \*, Klaus Rothermund , Matthäus Rudolph , Thomas Weiß

*Friedrich-Schiller-Universität Jena*

Affective consequences influence learning by impacting the probability that a behavior will be repeated. Hence, the modulation of stimulus-response binding and retrieval (SRBR) effects through affective consequences holds implications on whether SRBR can be viewed as a contributor to instrumental learning. In this talk, I will present recent findings indicating that affective consequences in form of aversive heat stimuli do not influence binding and retrieval mechanisms. Replicating the results of Parmar and Rothermund (2024), who had employed monetary rewards as affective consequences, the data suggest that binding and retrieval effects are automatic and independent of affective consequences. I will discuss this conclusion in terms of the implications for our understanding of the relationship between SRBR and learning.

**Keywords:** Stimulus-response binding and retrieval, SRBR

**Presentation type:** Original Research Talk

**Session:** Dissociating effects of episodic retrieval of recent stimulus-response episodes versus contingency awareness as a source of learning

## Sources of long-term color-word contingency learning: Evidence from the alternating blocks paradigm

Klaus Rothermund <sup>1\*</sup>, Lennart Kapinos <sup>1</sup>, Jan De Houwer <sup>2</sup>, James Schmidt <sup>3</sup>

<sup>1</sup> FSU Jena, <sup>2</sup> University of Ghent, <sup>3</sup> Université de Bourgogne

To investigate long-term contingency learning that is free from recency-based episodic retrieval, we developed a paradigm in which two non-overlapping sets of words and colors were presented in alternating blocks of the experiment (“alternating blocks paradigm”). In each block, participants had to respond to the color of words, and each of the words appeared more frequently in one of the colors than in the other colors (color-word contingency learning). Long-term contingency learning effects were assessed only on the basis of the first occurrences of each word in a block, ruling out that the word could retrieve a recent episode from the same block. Due to the rationale of the paradigm, the last occurrence of words for these trials always dated back more than a complete block (> 30 trials). In a preregistered study (n=110), we found reliable contingency learning effects for the first occurrences of words in each block, indicating long-term learning of the contingencies that is independent of episodic retrieval. Furthermore, and in line with recent findings from our lab (Rudolph & Rothermund, 2024; Rudolph et al., in press), these long-term contingency learning effects depended on contingency awareness: Reliable long-term contingency learning effects were obtained only for those words for which the color-word contingency was correctly identified at the end of the experiment. In sum, our findings indicate that long-term color-word contingency learning reflects propositional learning.

**Keywords:** Contingency learning, episodic response retrieval, stimulus-response binding, law of recency, contingency awareness, propositional knowledge, association formation

**Presentation type:** Original Research Talk

**Session:** Dissociating effects of episodic retrieval of recent stimulus-response episodes versus contingency awareness as a source of learning

## Manipulating instructions to dissociate episodic retrieval and propositional knowledge in valence contingency learning

Carina Giesen \*

*HMU Health and Medical University Erfurt*

In the valence contingency learning (VCL) task, participants evaluate target words which are preceded by nonwords. Nonwords are predictive for positive/negative evaluations. This produces robust contingency learning (CL) effects, reflected in faster and more accurate performance for highly contingent nonword-valence pairings. Previous findings indicate controlling for episodic retrieval of transient stimulus-response episodes reduces CL effects, but does not eliminate them. These residual CL effects are best explained by propositional knowledge. In the present talk, I will present findings from different manipulations that aim to influence participants beliefs about contingencies in the VCL task. This is achieved by merely instructing contingencies (a) in a task that does not include any actual contingencies (study 1) and (b) in a task in which the actual contingencies contradict the instructed contingencies (study 2). Both studies assess effects of valence contingency learning, evaluative conditioning, and contingency awareness of instructed and actually experienced contingencies for nonwords. Implications for theories on processes underlying contingency learning and evaluative conditioning are discussed.

**Keywords:** contingency learning, stimulus-response binding, episodic retrieval, propositional knowledge

**Presentation type:** Original Research Talk

**Session:** Dissociating effects of episodic retrieval of recent stimulus-response episodes versus contingency awareness as a source of learning

## Summarizing discussion on the relation of stimulus-response bindings and learning

Birte Moeller <sup>\*</sup>, Christian Frings

*University of Trier*

The relation between two core processes in action control (binding and retrieval) and learning has been much debated in recent years (e.g., Giesen et al., 2020; Moeller & Frings, 2017; Rudolph et al., 2024). While binding effects are sometimes still treated like a form of association learning, short-term binding effects have also successfully been distinguished from certain forms of learning. Here we summarize a recently proposed framework that explains some of the previous failures to detect meaningful relations between binding and learning by referring to the role of the variables decay, number of repetitions, time elapsing between repetitions, and interference (Frings et al., 2023). This approach will be discussed in the context of other contributions to this symposium.

**Keywords:** action control, binding and retrieval, learning

**Presentation type:** Original Research Talk

**Session:** Dissociating effects of episodic retrieval of recent stimulus-response episodes versus contingency awareness as a source of learning

---

## The Role of Episodic Retrieval in Evaluative Conditioning: Evaluative Conditioning Effects Differ Depending on the Temporal Distance to the Last Stimulus Pairing

Jasmin Richter <sup>1\*</sup>, Carina G. Giesen <sup>2</sup>

<sup>1</sup> *University of Oslo*, <sup>2</sup> *HMU Health and Medical University Erfurt*

Liking of a formerly neutral stimulus can change when it co-occurs with positive or negative stimuli, a phenomenon called evaluative conditioning (EC). Prior research suggests that EC depends on remembering information about previous stimulus co-occurrences when the neutral stimulus is evaluated. According to a recently proposed integrative episodic retrieval account of contingency learning (Rothermund et al., 2024), the temporal distance to the last occurrence of a stimulus

determines which of the previous experiences with the stimulus is retrieved from memory, favoring the most recent experience after short temporal delays and most frequent experiences after longer delays. In this research, we tested whether EC follows the same retrieval principles. Across three online experiments, we found that evaluations of a formerly neutral stimulus reflected the valence most recently paired with it when measured shortly after the pairing but reflected the most frequently paired valence when measured after a longer delay. Our research supports the role of episodic retrieval processes in EC and contributes to recent theoretical focus on memory mechanisms in EC. Furthermore, our findings highlight parallels to contingency learning, suggesting that episodic memory processes may govern various types of learning resulting from stimulus contingencies.

**Keywords:** evaluative conditioning, episodic retrieval, contingency learning, episodic memory

**Presentation type:** Original Research Talk

**Session:** Dissociating effects of episodic retrieval of recent stimulus-response episodes versus contingency awareness as a source of learning

## BINDING INFORMATION IN MEMORY AND ACTION CONTROL - PART 1: ACTION CONTROL/MEMORY

---

### Is Cognitive Control Adjusted to Deal with Partial Repetitions in Task Switching

Elena Benini \*, Iring Koch , Andrea M. Philipp

*RWTH Aachen*

When acting intentionally, humans respond to stimuli based on their goals, which sometimes requires responding differently to the same stimulation or performing the same response to a different stimulus. Such recombining of responses and stimuli often hinders performance, yielding partial repetition costs (PRCs). PRCs are considered an after-effect of feature-binding processes, but the underlying process remains unclear. PRCs were alternatively attributed to time-consuming unbinding, or to solving the conflict between the current and the previous episode. Crucially, the role of control processes remains unexplored. If PRCs imply conflict, control might be recruited to handle PRCs. Hence, control level might be adjusted following a partial repetition, as in the well-known conflict adaption phenomenon. We re-analysed seven task-switching datasets (Ntotal = 591) seeking adaptation to partial repetitions, i.e. trials where the task repeats and the response switches, or vice versa. In every dataset, reaction times in partial repetitions shrank when trial N-1 was also a partial repetition, compared to a full switch. This could reflect reduced feature binding or retrieval, or a carryover of a heightened control state from the previous trial. Interestingly, in 3 out of 7 datasets, full repetitions were faster when trial N-1 was a partial repetition, compared to a full switch (and only numerically in two additional datasets). This contrasts with weaker binding or retrieval and it favours more control being deployed after a partial repetition compared to a full switch. These findings suggest that cognitive control is recruited to deal with partial repetitions in task switching.

**Keywords:** task switching, partial repetition costs, episodic retrieval, feature binding, control adaptation

**Presentation type:** Original Research Talk

**Session:** Binding information in memory and action control - Part 1: Action control/memory

## **Compatibility between Actions and Effects Increases their Short-Term Binding**

Viola Mocke \*, Wilfried Kunde , Marcel R. Schreiner

*Julius-Maximilians-Universität Würzburg*

Each action produces a range of effects, and the degree to which an effect is compatible with the action that caused it may affect the strength of the memory link between the two. Two experiments explored this role of action-effect compatibility in the formation of action-effect bindings and the retrieval of actions when their effects are encountered again. Participants performed a sequential prime-probe task. In the prime trials, they freely chose a keypress that triggered a spatially (in)compatible box movement, followed by the presentation of a word. In the subsequent probe trials, participants executed another free-choice action upon seeing either the same word or a different one. Overall, when the prime word was repeated in the probe, participants were more likely to repeat the same action, indicating that actions were retrieved through the presentation of the effects. Crucially, this influence was stronger following compatible prime episodes than incompatible ones. It is possible that compatible effects were more tightly bound to their corresponding actions, resulting in higher rates of action retrieval when the same effects were encountered again. However, this influence of action-effect compatibility did not extend to declarative memory for the identities of the effects. These findings suggest that, in short-term contexts, action-effect compatibility plays a key role in the binding and retrieval of actions.

**Keywords:** feature binding, learning, memory, action-effect compatibility, event file

**Presentation type:** Original Research Talk

**Session:** Binding information in memory and action control - Part 1: Action control/memory

---



## Control-Related Sustained Learning of Action-Effect Relations

Marcel Schreiner \*, Wilfried Kunde

*University of Würzburg*

Through interactions with our environment, we sample information. These interactions involve motor activities (actions) which cause perceptual changes (effects) that vary regarding various features. This information needs to be bound together in memory to enable learning and goal-directed actions. We investigated such learning and how varying degrees of control over spatial effect features impacts long-term memory for effect identity. In two experiments, spatial actions produced a spatially congruent or incongruent movement of a box and the subsequent appearance of an object image (effect identity). Memory for effect images was probed in a later old/new recognition test. If participants indicated an image as being old, we additionally probed whether they could reproduce the action which had previously caused it. In a third experiment, we kept the spatial effect component constant to more directly probe action-effect-identity binding. Applying cognitive modeling, we found mixed evidence for influences of action-effect congruency on memory for effect identity, but consistent evidence for sustained binding between actions and effect-identity. This was the case even though participants encountered each action-effect episode only once. These findings suggest that action-effect bindings can be represented in long-term memory and that the formation of representations pertaining to action-effect episodes is facilitated by control.

**Keywords:** action control, feature binding, memory, recognition, action retrieval, cognitive modeling

**Presentation type:** Original Research Talk

**Session:** Binding information in memory and action control - Part 1: Action control/memory

## Challenging binding of control states under continuous hand-arm vibration

Andrea Kiesel <sup>1\*</sup>, Andreas Lindenmann <sup>2</sup>, Sven Matthiesen <sup>2</sup>, Anne Voormann <sup>1</sup>

<sup>1</sup> University of Freiburg, <sup>2</sup> Karlsruhe Institute of Technology

In interference task, such as the temporal Flanker task, congruence effects are reduced after incongruent rather than congruent trials in n-1. These sequential modulations (congruence sequence effects, CSE) can be explained in terms of encoding and retrieval of control states in consecutive trials. While such binding effects of control states have been repeatedly demonstrated in well-controlled experimental settings, it is an open question whether similar effects can be observed in real-life conditions. As a first attempt to explore whether binding of control states can be assumed in working conditions with power tools, we assessed CSE under conditions of constant or randomly varying hand-arm vibration. Results revealed that CSEs were not affected by vibration. This can be taken as a first hint that cognitive control mechanisms might generalize to complex work settings – and that at least some cognitive paradigms are sufficiently stable to reveal effects under real-life disturbances.

**Keywords:**

**Presentation type:** Original Research Talk

**Session:** Binding information in memory and action control - Part 1: Action control/memory

---

## Binding Actions and their Effects for Action Control: Conclusions Based on Anticipatory Eye Movements

Christina U. Pfeuffer \*

*Catholic University of Eichstätt-Ingolstadt*

Actions that consistently yield the same effects become bound to these effects within action-effect bindings/associations that allow for long(er)-term retrieval. These action-effect bindings are bi-directional. That is, the anticipation of desired future effects allows us to select actions bound to them. Importantly, anticipated future effects also proactively direct our attention towards them even

before they appear, as anticipatory saccades towards the predictable locations of future effects confirm. These anticipatory saccades enable us to investigate, for instance, which features of future effects (e.g., effect location and timing) become bound to the respective effect-causing actions, how often actions and effects need to be paired for action-effect bindings to emerge and to be updated, and how anticipated effect features impact on action selection. Here, I will summarize first conclusions on action-effect binding drawn based on anticipatory saccades, focusing on the formation and updating of bindings and corresponding inferences regarding their representation in memory.

**Keywords:** action control, action-effect learning/binding, eye tracking, anticipatory saccades, proactive effect monitoring

**Presentation type:** Original Research Talk

**Session:** Binding information in memory and action control - Part 1: Action control/memory

## **BINDING INFORMATION IN MEMORY AND ACTION CONTROL - PART 2: MEMORY/ACTION CONTROL**

---

### **Reducing binding deficits: Emotionality effects in source memory of younger and older adults under self-reference**

Nikoletta Symeonidou \*, Hannah Z. Hennig , Beatrice G. Kuhlmann

*University of Mannheim*

Older adults often demonstrate pronounced difficulties in memory binding, leading to an age-related source memory deficit. Our study aimed to examine whether this deficit could be alleviated by using emotional sources and self-referencing (SR) encoding strategies. In an online experiment, 106 younger and 102 older adults were presented with smiling, sad-looking, and neutral faces as sources, paired with neutral sentences as items. Participants encoded these either through self-referencing (SR) or a control encoding strategy. Source memory performance was assessed using a multinomial model. Results indicated that emotional sources improved source memory for both

younger and older adults, but only in the SR condition. No effect of emotion on source memory was observed in the control condition. Contrary to expectations, SR enhanced source memory only in younger adults but not in older adults. It is possible that the SR instructions used in this study were more complex and cognitively demanding than those in previous research, diminishing their potential memory-enhancing effect in older adults. Future research should thus explore simpler SR strategies to determine their efficacy in older adults' source memory.

**Keywords:** source memory, cognitive aging, emotion, self-referencing, multinomial modeling

**Presentation type:** Original Research Talk

**Session:** Binding information in memory and action control - Part 2: Memory/action control

---

## **A Neurophysiological Perspective on Differences between Working Memory Binding and Updating**

Kathrin Sadus <sup>1\*</sup>, Anna-Lena Schubert <sup>2</sup>, Christoph Löffler <sup>1, 2</sup>, Wiebke Hemming <sup>1</sup>, Dirk Hagemann <sup>1</sup>

<sup>1</sup> Heidelberg University, <sup>2</sup> University of Mainz

The encoding of information involves integrating multiple pieces of information, which constitutes an essential ability for higher cognitive functions such as working memory. Common tasks used to measure working memory capacity include binding tasks, which assess the ability to build and maintain associations between mental representations, and updating tasks, which involve flexibly changing these associations between different pieces of information. However, the underlying neurocognitive processes behind these tasks remain unclear. In this talk, we present findings from a study that investigated the specific and general neurophysiological mechanisms involved. To do this, we designed a set of tasks in order to distinguish and examine the nature of binding and two types of updating processes: substitution and transformation. Participants (N= 150, female = 89, Mage = 34.77, SD = 12.78) completed a binding and two updating tasks while an EEG was recorded. Mass univariate cluster-based permutation analyses of event-related potentials revealed a temporally and spatially widespread cluster when comparing binding and updating demands. These differences may reflect neurophysiological correlates of early attentional processes and the costs associated with updating. Additionally, the comparison between the two types of updating demands—substitution and transformation—revealed a more temporally concentrated cluster within the typical P3 time window. As a result, our findings highlight significant differences in the neurophysiological processes involved in binding and updating, while suggesting greater similarities between the various updating demands.

**Keywords:** working memory, binding, updating, EEG, cluster-based permutation

**Presentation type:** Original Research Talk

**Session:** Binding information in memory and action control - Part 2: Memory/action control

---

## **Declarative and Procedural Bindings in Working Memory: Similarities in Maintenance and Repetition Learning**

Isabel Courage \*, Gidon T. Frischkorn

*University of Zurich, Switzerland*

Researchers typically conceptualize working memory representations as bindings. A distinction is made between two types of bindings: declarative and procedural bindings. Declarative bindings refer to objects of thought and represent bindings between contexts and contents, for example, a list position and a list item, such as a digit. Procedural bindings refer to actions performed on these objects of thought and describe bindings between conditions and actions, for example, executing a specific response if an even digit is displayed. However, it remains unclear whether maintenance and repetition learning are similar for these two kinds of bindings in working memory. In previous research, methodological differences in the experimental tasks and the behavioral measures applied to these binding types make a comparison between them challenging. To address these differences, we developed a declarative and a procedural version of a Hebb repetition task. Within these tasks, we repeated different lists either fully, partially, or not at all throughout the course of the tasks. To compare the cognitive processes underlying maintenance and repetition learning of declarative and procedural list contents, we implemented a cognitive measurement model. The results suggest that repetition learning develops similarly for lists with declarative and procedural bindings that were fully repeated. Additionally, we observed that the build-up of proactive interference through previous response selections influence both binding types alike for partially repeated lists. Taken together, there is an overlap in the maintenance and repetition learning for declarative and procedural bindings in working memory.

**Keywords:** Working Memory, Bindings, Repetition Learning, Declarative, Procedural

**Presentation type:** Original Research Talk

**Session:** Binding information in memory and action control - Part 2: Memory/action control

## **Binding in episodic memory: the role of sleep in memory abstraction and pattern completion**

Nicolas D. Lutz \*

*Ludwig-Maximilians-Universität München*

Episodic memory involves hippocampal binding of different aspects of an experience into a unique spatio-temporal context. During sleep, repeated memory reactivation gradually strengthens the distributed neocortical representations, fostering a “corticalization” and integration of encoded information into pre-existing memory networks. As a result, complete representations can be reinstated by activating only parts of the memory trace in a process referred to as pattern completion. The gradual corticalization during sleep further entails a qualitative transformation that supports higher-level abstraction and generalization, resulting in gist-like representations of invariant information from overlapping experiences. In my presentation, I will highlight recent advances in episodic memory binding, with a particular focus on sleep’s role in memory abstraction and pattern completion.

**Keywords:** sleep, episodic memory, abstraction, pattern completion

**Presentation type:** Original Research Talk

**Session:** Binding information in memory and action control - Part 2: Memory/action control

## **Assessing the Electrophysiological Consequences of Long-Term Learning on Visual Working Memory Representations.**

Philipp Musfeld <sup>1\*</sup>, William Ngiam <sup>2</sup>, Kirsten Adam <sup>3</sup>, Olga Kozlova <sup>3</sup>, Olya Bulatova <sup>4</sup>, Keisuke Fukuda <sup>4</sup>

<sup>1</sup> *University of Zurich*, <sup>2</sup> *The University of Adelaide*, <sup>3</sup> *Rice University*, <sup>4</sup> *University of Toronto*

Working memory (WM), our central system for temporarily binding task-relevant information to the current context for ongoing processing, is limited in capacity. To overcome such limitations, we frequently leverage prior knowledge from long-term memory (LTM), allowing us to integrate and represent information more efficiently. Yet, it is not well understood how prior knowledge affects the representation of information in working memory. Here, we assessed how prior learning affects the load of a visual WM representation by using multivariate load classification from EEG. Participants (N=30) learned a 6-color visual array to criterion, and then completed a WM task including both new and pre-learned arrays. Crucially, new arrays differed in set size (0, 1, 2 or 6), which we used to train a classifier to identify WM load from the multivariate EEG signal. After establishing strong classification accuracy (~55%; chance = 25%), we asked the classifier to predict the load elicited by pre-learned arrays. We find evidence that the availability of LTM for pre-learned arrays reduced WM load, as the classifier predicts a load of 1 or 2, instead of 6 – the actual set size of pre-learned arrays. However, further exploration revealed that LTM representations were still dissociable from pure WM representations. Our results suggest that the availability of prior knowledge can reduce WM load by reducing the number of bindings that have to be maintained but leads to qualitative different representations as indicated by distinct changes in multivariate neural signals.

**Keywords:** Working Memory, Long-Term Memory, Chunking, Repetition Learning, EEG

**Presentation type:** Original Research Talk

**Session:** Binding information in memory and action control - Part 2: Memory/action control

# LEVELS OF ORTHOGRAPHIC REPRESENTATION: FROM RETINA TO WORD FORM

---

## Variability in Letters, Clarity in Words: Flux in Models

Maria Fernández-López \*

*University of València*

Imagine reading a word that has letters twisted, turned, or transformed—yet you still recognize it effortlessly. This phenomenon underscores the flexibility of letter detectors, a critical component of orthographic processing that allows readers to navigate the complexities of written language. Importantly, this flexibility enables efficient word recognition despite variations in letter identity and order. Research has shown that our brains can handle quite a bit of "noise" in letter identity (e.g., see Fernández-López et al., in press, for CAPTCHA-like examples) or in letter position (Perea & Lupker, 2003). In this presentation, we highlight how only understanding the flexibility of letter detectors, we gain valuable insights into the cognitive processes behind reading. Thus, it is mandatory for models to incorporate flexible letter detection mechanisms, accommodating variability without losing precision.

Fernández-López, M., Solaja, O., Crepaldi, D., & Perea, M. (in press). Top-down feedback normalizes distortion in early visual word recognition: Insights from masked priming. *Psychonomic Bulletin & Review*.

Perea, M., & Lupker, S. J. (2003). Does jugde activate COURT? Transposed-letter confusability effects in masked associative priming. *Memory and Cognition*, 31, 829-841.

**Keywords:** orthographic processing, visual word recognition, flexibility

**Presentation type:** Original Research Talk

**Session:** Levels of orthographic representation: From retina to word form

---



## Distilling the neural code of invariant visual word recognition

Aakash Agrawal \*

*Neurospin, CEA Gif-sur-Yvette, Paris, France*

Learning to read significantly rewires the brain, placing constraints on the visual system. For example, to distinguish between anagrams like FORM and FROM, we need to encode both individual letters and their exact positions, despite changes in size, font, or position. Earlier models proposed "bigram units" that encode letter pairs (e.g., FO, OR in FORM and FR, RO in FROM) to differentiate such words. However, recent studies did not find evidence for these units, instead suggesting a model where letters are encoded by their position. To empirically test this competing hypothesis at the circuit level, we trained convolutional neural networks (CNNs) to recognize words. After training, a small group of units became specialized for word recognition, similar to the Visual Word Form Area (VWFA). These units responded to specific letters and their positions, either from the left or right of the word. A shift from retinotopic to position-based coding was achieved by "space bigram" units, which detect letter positions relative to blank spaces. This coding approach aligns with wirelessly recorded neural activity from the inferior temporal (IT) cortex of macaque monkeys trained on orthographic tasks over five successive days. While retinotopic based coding was dominant in these monkeys, we did find neurons encoding ordinal positions. Thus, our CNN-based simulations offer a possible model for how the brain processes written words.

**Keywords:** Reading, convolutional neural network, orthography

**Presentation type:** Original Research Talk

**Session:** Levels of orthographic representation: From retina to word form

## Does letter perception follow principles of predictive coding?

Janos Pauli \*, Benjamin Gagl

*University of Cologne Department of Special Education and Rehabilitation Self Learning Systems  
Lab*

Applying the principles of predictive coding to reading enhances our understanding of the neuro-cognitive processes involved in extracting meaning from text. Central is integrating prior knowledge with the sensory input to highlight the informative parts of a visual percept, thus increasing the efficiency of the representation and processing in the visual pathway.

Predominant computer vision models of higher vision are deep learning models. While adept at word and letter prediction, they lack transparency and insight into their decisions, emphasizing the need for models that respect neuro-cognitive principles and allow the explanation of how we read.

The first visual word recognition model that considers neuro-cognitive principles has been promising but needs an explicit account for recognizing the central unit of words: Letters. Here, we introduce a transparent image-computable letter identification model based on representations respecting the principles of predictive coding.

We use a dataset of 520 uppercase Latin alphabet letters presented in four font styles and sizes.

We generate prediction error images and pixel-based letter representations from this dataset and train logistic regression models on both prediction error representations and letter images.

We evaluate the model based on out-of-distribution samples with varying noise levels and behavioral letter recognition data from humans who perceived the same images.

Preliminary results indicate that prediction error-based classification surpasses other methods, closely aligning with human performance.

Additionally, recognition accuracy was highest in conditions that favored predictive coding mechanisms, supporting its role in letter perception. These results indicate that letter perception relies on optimized prediction-error representations.

**Keywords:** Reading, Predictive Coding, Computational Cognitive Neuroscience, Image Computation, Transparent AI, Vision

**Presentation type:** Original Research Talk

**Session:** Levels of orthographic representation: From retina to word form

## Non-Human Recognition of Orthography: How is it implemented and how does it differ from Human orthographic processing

Benjamin Gagl <sup>1\*</sup>, Ivonne Weyers <sup>2</sup>, Susanne Eisenhauer <sup>3</sup>, Christian J. Fiebach <sup>3</sup>, Michael Colombo <sup>4</sup>, Damian Scarf <sup>4</sup>, Johannes C. Ziegler <sup>5</sup>, Jonathan Grainger <sup>5</sup>, Onur Güntürkün <sup>6</sup>, Jutta L. Mueller <sup>2</sup>

<sup>1</sup> University of Cologne, <sup>2</sup> University of Vienna, <sup>3</sup> Goethe University Frankfurt, <sup>4</sup> University of Otago, <sup>5</sup> Aix-Marseille University, CNRS, <sup>6</sup> Ruhr Universität Bochum

The ability to robustly recognize strings of letters, a cornerstone of reading, was observed in Baboons and Pigeons despite their lack of phonological and semantic knowledge. Here, we apply a comparative modeling approach investigating the neuro-cognitive basis of Human, Baboon, and Pigeon orthographic decision behavior, addressing whether phylogenetic relatedness entails similar underlying neuro-cognitive phenotypes. We use the highly transparent Speechless Reader Model (SLR), which assumes letter string recognition based on widely accepted computational principles of predictive coding so that orthographic decisions rely on a prediction error signal emerging from multiple, hierarchically ordered representational levels, i.e., low-level visual, letter, or letter sequence representations. We investigate which representations species use during successful orthographic decision-making. We introduce multiple SLR variants, each including one or multiple prediction error representations, and compare the simulations of each SLR variant to the orthographic decisions of individuals of three species after learning meaningless letter strings. Humans predominantly relied on letter-sequence-level representations, resulting in the highest task performance in behavior and model simulations. Baboons also relied on sequence-based representations but in combination with pixel- and letter-level representations. In contrast, all Pigeons relied on pixel-level representations, partly in combination with letter- and letter-sequence-level representations. These findings suggest that orthographic representations utilized in orthographic decisions reflect the phylogenetic distance between species: Humans and Baboons use more similar representations compared to Pigeons. Overall, the description of orthographic decisions based on a small set of representations and computations was highly successful in describing behavior, even for Humans who mastered reading in its entirety.

**Keywords:** reading, orthography, visual perception, humans, baboons, pigeons

**Presentation type:** Original Research Talk

**Session:** Levels of orthographic representation: From retina to word form

## Optimal Transport as a Computational Framework for Low-Level Orthography

Jack E. Taylor <sup>1, 2\*</sup>, Rasmus Sinn <sup>1</sup>, Cosimo Iaia <sup>1</sup>, Christian J. Fiebach <sup>1, 3</sup>

<sup>1</sup> Department for Psychology, Goethe University Frankfurt, Frankfurt am Main, Germany, <sup>2</sup> School of Psychology and Neuroscience, University of Glasgow, Glasgow, United Kingdom, <sup>3</sup> Brain Imaging Center, Goethe University Frankfurt, Frankfurt am Main, Germany

In the earliest stages of visual word recognition, readers have to recognise and combine strokes into characters, radicals, and letters. Human readers are able to tolerate a great deal of variability in the visual features of orthography, including considerable variability in typography, and geometric features like size and rotation. Despite this, cognitive models of visual word recognition have traditionally either simplified or overlooked this early stage of orthographic processing. We suggest that optimal transport theory may provide a computationally explicit framework for modeling early orthographic processing. In a representational similarity analysis of electroencephalography (EEG) data from a letter recognition task, we show that Wasserstein distances, capturing a global cost between letter shapes, align with neural representational dissimilarities, outperforming existing models based on the degree of overlap between pixels. We compare the model's performance to that of artificial neural networks trained to recognise letters from images, showing that Wasserstein distance performs similarly to features extracted from Resnet-50 and CORnet-Z, despite being more computationally explicit than a neural network, and requiring no training. We additionally show that an optimal transport framework can be extended to capture invariance to geometric transformations like rescaling, rotation, and translation. Finally, we show how the optimal transport approach that we suggest can account for the rich typography of real world letters, and relate it to existing approaches to modeling visual letter and word recognition.

**Keywords:** orthography, vision, representational similarity analysis, reading

**Presentation type:** Original Research Talk

**Session:** Levels of orthographic representation: From retina to word form

## FIELD EXPERIMENTS WITH MICRO-RANDOMIZED TRIALS: APPLICATIONS FROM RESEARCH ON PHYSICAL ACTIVITY, SELF- REGULATED LEARNING, AND ENVIRONMENTAL PSYCHOLOGY

---

### Boosting Mind and Mood? A Micro-Randomized Trial Testing Short-Term Effects of Physical Activity and Breathing Exercises

Lena M. Wieland <sup>1, 2\*</sup>, Andreas Neubauer <sup>2, 4</sup>, Florian Schmiedek <sup>1, 2, 3</sup>

<sup>1</sup> Education and Human Development, DIPF | Leibniz Institute for Research and Information in Education, Frankfurt am Main, Germany, <sup>2</sup> Center for Research on Individual Development and Adaptive Education of Children at Risk (IDeA), Frankfurt am Main, Germany, <sup>3</sup> Department of Educational Psychology, Goethe-University, Frankfurt am Main, Germany, <sup>4</sup> Developmental Psychology and Research Methods, RWTH Aachen University, Aachen, Germany

We examined whether specific behavioral encouragements could have short-term effects on students' cognitive performance and affective well-being in daily life. Cross-sectional research suggests positive relationships between physical activity and executive functioning, though findings on short-term effects of physical activity on children's executive functions remain inconsistent. Moderate to vigorous physical activity, however, has been linked to short-term improvements in affective well-being. Breathing exercises were shown to reduce anxiety and increase feelings of relaxation and may therefore provide another easy to implement strategy to improve affective well-being. We conducted a micro-randomized trial with fifth and sixth-grade students (N = 245) in which experimental conditions were randomly assigned to measurement points (at the class-level). Students provided responses to ecological momentary assessments (EMAs) over 20 school days, with four measurements per day (morning n = 3358, school n = 3176, afternoon n = 2554, evening n = 2881). EMAs covered subjective experiences (including sleep-quality, affect, worries) and a working memory task, while physical activity was passively monitored. Experimental conditions included (1) physical activity breaks on 10 school days, (2) breathing exercises on 10 evenings, and (3) 10 control occasions in school and evening sessions with no intervention. Contrary to expectations, physical activity breaks had no significant effects on working memory accuracy, but

reduced negative affect. Breathing exercises improved relaxation, especially on days where students reported above-average levels of worries. We will further highlight analyses on individual differences in these relationships and discuss implications of our findings for the development of personalized and adaptive interventions.

**Keywords:** micro-randomized trial, ecological momentary assessments, intervention, cognitive performance, physical activity, affect, relaxation

**Presentation type:** Original Research Talk

**Session:** Field experiments with micro-randomized trials: Applications from research on physical activity, self-regulated learning, and environmental psychology

---

## **Causal effects of sedentary breaks on affective and cognitive parameters in daily life: A within-person encouragement study**

Marco Giurgiu <sup>1\*</sup>, Irina Timm <sup>1</sup>, Ulrich Ebener-Priemer <sup>1,2</sup>, Florian Schmiedek <sup>3</sup>, Andreas Neubauer <sup>4</sup>

<sup>1</sup> *Institute of Sports and Sports Science, Karlsruhe Institute of Technology (KIT), Engler-Bunte-Ring 15, 76131 Karlsruhe, Germany*, <sup>2</sup> *Department of Psychiatry and Psychotherapy, Central Institute of Mental Health, University of Heidelberg, Medical Faculty Mannheim, Mannheim, Germany*, <sup>3</sup> *DIPF | Leibniz Institute for Research and Information in Education; Rostocker Straße 6, 60323 Frankfurt am Main*, <sup>4</sup> *Institute of Psychology; RWTH Aachen University; Dennewartstraße 25-27, 52068 Aachen*

Understanding the complex relationship between sedentary breaks, affective well-being, and cognition in daily life is critical as modern lifestyles are increasingly characterized by sedentary behavior. Previous studies have provided evidence that short sedentary breaks are feasible to integrate into daily life and can improve affective and cognitive parameters. However, observational studies do not allow for causal interpretation. To overcome this limitation, we conducted the first empirical study that integrated the within-person encouragement approach to test the causal effects of short 3-minute sedentary breaks on affective and cognitive parameters in daily life. We recruited 222 university employees in a two-weeks ambulatory assessment study. In particular, physical behavior was captured with a thigh-worn accelerometer while completing up to six smartphone-based assessments of self-reported affective states and working memory performance. Results of

two-level structural equation modeling revealed that compared to uninterrupted sedentary bouts ( $\geq 30$  minutes), short three-minute sedentary breaks had a positive causal effect on the affective state dimensions valence and energetic arousal. Contrary to expectations, no significant effect was found for working memory performance and the affective state dimension of calmness. Furthermore, as expected the variation in encouragements regarding the intensity level (i.e., standing, slow walking, and fast walking) positively predicted the following intensity behavior, and the intensity rating was linearly associated with valence and energetic arousal. Our methodological approach demonstrated the possibility of moving towards investigating causal effects in everyday life showing that short sedentary breaks are positively related to affective states.

**Keywords:** Sedentary behavior, just-in-time trigger, wearables, within-person encouragement

**Presentation type:** Original Research Talk

**Session:** Field experiments with micro-randomized trials: Applications from research on physical activity, self-regulated learning, and environmental psychology

---

## Planning promotes regular studying – the higher the plan quality the better: a micro-randomized trial

Mirijam Schaaf <sup>1, 3\*</sup>, Garvin Brod <sup>1, 2, 3</sup>, Jasmin Breitwieser <sup>1, 3</sup>

<sup>1</sup> *Education and Human Development, DIPF | Leibniz Institute for Research and Information in Education, Frankfurt am Main, Germany*, <sup>2</sup> *Department of Psychology, Goethe University, Frankfurt am Main, Germany*, <sup>3</sup> *IDeA-Center for Research on Individual Development and Adaptive Education of Children at Risk, Frankfurt am Main, Germany*

This study investigated whether implementation intentions could be a promising metacognitive strategy for self-regulated learning, helping students to develop beneficial study routines by planning when and where to study. In a 42-day micro-randomized trial, we examined the effectiveness of a mobile intervention with the goal to increase the likelihood of children studying with a vocabulary learning app. Children ( $N = 357$ ) received mobile prompts in the evening asking them to formulate appropriate implementation intentions (i.e., if-then plans specifying when and where children would like to study; “When I finished brushing my teeth, then I will study vocabulary.”) for the next day to increase the likelihood of studying vocabulary. In addition, ambulatory assessment was used to capture children’s daily fluctuations in motivation.

Results indicated that the effectiveness of planning depended crucially on the quality of the plan. Using a newly developed rubric to classify plan quality based on the specificity, saliency, and contextual aspects of the plan, we show that the higher the plan quality, the more likely children were to study the next day. Further, our results suggest that within-person differences in plan quality across days are associated with children's day-to-day motivational fluctuations rather than their general ability to make high-quality plans.

These findings suggest that well-formulated if-then plans are a useful metacognitive strategy for action control. For children to plan their own studying, researchers and teachers need to ensure that they explain it carefully, provide examples of high-quality plans, and preferably scaffold the creation of plans by providing feedback.

**Keywords:** self-regulated learning, planning, implementation intentions, mobile interventions, prompting, vocabulary learning, micro-randomized trial

**Presentation type:** Original Research Talk

**Session:** Field experiments with micro-randomized trials: Applications from research on physical activity, self-regulated learning, and environmental psychology

---

## **Pro-Environmental Behavior and Social Connectedness in Daily Life: A Within-Person Encouragement Design Intervention for Italian Young Adults**

Silvia Caldaroni <sup>1\*</sup>, Maria Gerbino <sup>1</sup>, Florian Schmiedek <sup>2</sup>, Andreas B. Neubauer <sup>3</sup>, Lucia Manfredi <sup>1</sup>, Fulvio Gregori <sup>1</sup>, Concetta Pastorelli <sup>1</sup>, Giuseppe Corbelli <sup>1</sup>, Antonio Zuffianò <sup>1</sup>

<sup>1</sup> *Department of Psychology, Sapienza, University of Rome, Rome, Italy*, <sup>2</sup> *Department of Education and Human Development, Leibniz Institute for Research and Information in Education, Frankfurt am Main, Germany*, <sup>3</sup> *Developmental Psychology and Research Methods, Institute of Psychology, RWTH Aachen University, Aachen, Germany*

Research in Environmental Psychology has shown a positive association between Pro-Environmental Behaviors (PEBs) and distinct facets of Eudaimonic well-being, particularly Closeness to others. The personality trait of Conscientiousness is also positively linked to PEB, with more conscientious individuals engaging more in these behaviors. However, most studies have



focused on stable, interindividual differences, leaving the effect of momentary, intraindividual changes in PEB on Closeness unclear and lacking causal evidence.

We adopted a causal approach to examine whether positive fluctuations in PEB lead to positive changes in daily Closeness. Specifically, we implemented the Within-Person Encouragement Design, using instrumental variable estimation to assess whether manipulating daily PEB through micro-randomized encouragements would result in higher-than-usual levels of Closeness. Additionally, we explored how Conscientiousness moderates the effect of the encouragements on PEB.

We assessed 63 Italian young adults (Mean Age = 25.4; Women = 68%) over 21 days, during which participants received 11 randomized encouragements to engage in more PEBs than usual. Results showed a significant positive effect of the encouragement on PEB ( $\beta = 0.092$ , 95% CI: [.033, .142]), and importantly a significant positive effect of PEB on Closeness ( $\beta = 0.305$ , 95% CI: [.103, .449]). Additionally, encouragements were more effective for individuals with lower Conscientiousness ( $\beta = .163$ , 95% CI: [.063, .263])) compared to those with higher levels ( $\beta = .003$ , 95% CI: [-.093, .094])).

These findings shed light on the causal relationship between PEBs and well-being in everyday life, also offering valuable insights for promoting daily PEBs, particularly among younger generations.

**Keywords:** Within Person Encouragement Design; Pro-environmental behavior; Wellbeing; Instrumental variable estimation; Dynamic structural equation modeling (DSEM).

**Presentation type:** Original Research Talk

**Session:** Field experiments with micro-randomized trials: Applications from research on physical activity, self-regulated learning, and environmental psychology

## EMOTION REGULATION: NEURAL UNDERPINNINGS AND ASSOCIATIONS WITH EXECUTIVE FUNCTIONS

---

### Temporal Dynamics of Emotion Elicitation and Regulation in Euthymic Bipolar Patients and Healthy Controls

Kornelia Gentsch <sup>1\*</sup>, Sandra Schönfelder <sup>1</sup>, Philipp Kanske <sup>2</sup>, Michèle Wessa <sup>3,4</sup>

<sup>1</sup> Department of Clinical Psychology and Neuropsychology, Johannes-Gutenberg University, Mainz, Germany, <sup>2</sup> Clinical Psychology and Behavioral Neuroscience, Faculty of Psychology, Technische Universität Dresden, Germany, <sup>3</sup> Central Institute of Mental Health, Department of Neuropsychology and Psychological Resilience Research, Mannheim, Germany, <sup>4</sup> German Cancer Research Centre, Division of Cancer Survivorship and Psychological Resilience, Heidelberg, Germany

Understanding the temporal course of emotion elicitation and regulation is crucial, particularly in mood disorders like bipolar disorder. In this study, we analyze facial electromyography (EMG) data from euthymic bipolar patients (n=22) and matched healthy controls (n=22) to investigate the effects of emotion regulation strategies on facial muscle activity. Participants were instructed to view, reappraise, or distract while being presented with emotional stimuli (negative, positive, or neutral; the cognitive-emotion-regulation paradigm is described in Schönfelder et al., 2014).

Facial EMG activity (corrugator and zygomaticus muscles) was recorded and analyzed in 100-ms intervals. We hypothesize that emotional responses precede regulatory effects and predict group differences in timing. Euthymic bipolar patients may exhibit delayed regulation effects and heightened emotional reactivity compared to healthy controls. Specifically, emotion regulation effects in the corrugator may emerge later in bipolar patients, while emotional reactivity might occur earlier and more intensely. In the zygomaticus, we expect reduced or delayed regulation effects in bipolar patients.

The results will provide insights into the temporal dynamics of emotion regulation and its implications for mood disorders like bipolar disorder. Full results will be presented and discussed.

**Keywords:** emotion regulation, emotion induction, valence, bipolar patients

**Presentation type:** Original Research Talk

**Session:** Emotion regulation: Neural underpinnings and associations with executive functions

---

## **Association of cognitive flexibility and attentional control with emotion regulation?**

Christine Stelzel <sup>1\*</sup>, Lena M. Paschke <sup>2</sup>, Denise Doerfel <sup>3</sup>, Rosa Steimke <sup>4</sup>, Vera Ludwig <sup>5</sup>, Henrik Walter <sup>2</sup>

<sup>1</sup> *International Psychoanalytic University Berlin, Berlin, Germany*, <sup>2</sup> *Department of Psychiatry and Psychotherapy CCM, Charité–Universitätsmedizin Berlin, Berlin, Germany*, <sup>3</sup> *Faculty of Psychology, Technische Universität Dresden, Dresden, Germany*, <sup>4</sup> *Department of Psychology, University of Bremen, Bremen, Germany*, <sup>5</sup> *Department of Psychology, University of Pennsylvania, Philadelphia, USA*

Cognitive reappraisal is a form of emotion regulation requiring the reinterpretation of emotional stimuli. Cognitive flexibility and attentional control may support emotion regulation, but little is known about behavioral associations and neural overlap between regions associated with reappraisal, cognitive flexibility and attentional control. Due to its cognitive nature, we expect individual differences in cognitive flexibility to be related to reappraisal to a greater degree than attentional control.

Here, we tested this in a sample of N = 103 healthy young participants using fMRI. All participants performed an emotion-regulation paradigm with pictures, comparing ‘watch’ vs. ‘regulate’ trials, as well as a cued task-switching paradigm (i.e., cognitive flexibility) and a Flanker task with word stimuli (i.e., attentional control). Behaviorally, there was no robust association between reappraisal success as measured by reductions in arousal ratings and either task-switch costs or congruency effects in the Flanker task. The fMRI data revealed a selective association of attentional control with emotion regulation. Individuals with higher behavioral congruency effects (lower attentional control) engaged frontoparietal regions to a higher degree during reappraisal, presumably to compensate for greater distractibility. At the same time, individuals with higher inferior frontal activity in the Flanker task also showed greater frontoparietal activity during reappraisal. No such association was present for task switching.

These findings indicate that attentional control mechanisms are involved in down-regulating negative emotions via cognitive strategies but do not provide evidence for the expected association

with cognitive flexibility. Future studies might directly compare these associations between different emotion-regulation strategies.

**Keywords:** reappraisal, task-switching, Flanker task, fMRI

**Presentation type:** Original Research Talk

**Session:** Emotion regulation: Neural underpinnings and associations with executive functions

---

## From Strategies to Flexibility: Rethinking the Role of Executive Functions in Emotion Regulation

Luise Pruessner \*, Daniel V. Holt , Ilka Mueller , Sven Barnow , Katrin Schulze

*Department of Psychology, Heidelberg University (Germany)*

Emotion regulation is critical for adaptive behavior, yet its relationship with executive functions remains poorly understood. Despite growing interest, comprehensive reviews and meta-analyses addressing this link are limited. Here, we present convergent evidence from two laboratory studies ( $N = 199$ ,  $M_{Age} = 24.8$  years;  $N = 115$ ,  $M_{Age} = 23.3$  years) and a meta-analysis of 196 studies ( $N = 20,181$ ,  $M_{Age} = 26.9$  years) to examine the association between individual differences in emotion regulation ability and frequency (reappraisal, acceptance, suppression, rumination, and worry) and executive functions (inhibition, working memory updating, and set-shifting). Latent-variable modeling of the laboratory data identified the strongest associations between reappraisal ability and working memory updating ( $r = 0.15$ , 95% CI: 0.03–0.33). Consistent with these findings, the meta-analysis revealed a similar pattern, with reappraisal ability demonstrating the strongest link to working memory updating ( $r = 0.20$ , 95% CI: 0.07–0.33). Notably, no substantial relationships emerged between executive functions and the habitual use of emotion regulation strategies, challenging conventional assumptions about their interplay. Instead, these findings suggest a more nuanced relationship, where the ability to implement specific strategies, such as reappraisal, aligns with distinct executive functions like working memory updating. This research refines our understanding of the cognitive underpinnings of emotion regulation and underscores the need for alternative conceptual frameworks, such as emotion regulation flexibility, to better capture the dynamic and context-dependent roles of executive functions in emotion regulation.

**Keywords:** emotion regulation, executive functions, reappraisal, working memory updating, inhibition, shifting, regulatory flexibility

**Presentation type:** Original Research Talk

**Session:** Emotion regulation: Neural underpinnings and associations with executive functions

---

## The interplay of emotion regulation flexibility, negative affect, and cognitive control

Dorian de la Fuente , Julia Karbach \*

*RPTU Kaiserslautern-Landau*

The recent literature on emotion regulation (ER) suggests that successful ER may be facilitated through the flexible deployment of different strategies depending on contextual changes. Adaptive variability and flexibility in ER, in turn, have been proposed to depend on cognitive control. In our study, we examine (a) whether there is a link between variability in ER and three core executive functions (EF: inhibition, updating, shifting) and (b) whether there is an optimal level of ER flexibility that results in less negative affect. Participants (planned N = 120; current N = 59, age M = 37.33, SD = 16.67) completed six experimental EF tasks before taking part in a 14-day ambulatory assessment of current affect, ER strategy use, and context factors five times a day. ER flexibility was determined as the joint fluctuation of variable ER strategy use with contextual changes in multilevel models. Preliminary analyses showed that shifting, inhibition, and updating were positively correlated with everyday ER variability. Furthermore, affect as well as the quadratic term of affect predicted ER flexibility in multiple linear regression analyses. Our observation that each facet of EF was moderately associated with ER variability is consistent with the cognitive control framework of ER flexibility (Pruessner et al., 2020) and supports the conceptual overlap between ER and EF. The U-shaped association between flexibility and negative affect suggests that both too low and too high flexibility might be mal-adaptive and that there is an optimal level of ER variability depending on the valence of the situation.

**Keywords:** emotion regulation, variability, flexibility, cognitive control, executive functions, negative affect

**Presentation type:** Original Research Talk

**Session:** Emotion regulation: Neural underpinnings and associations with executive functions

---

## Emotion Regulation Capacity: Associations with Executive Functions and Regulation Tendency

Hannah Plueckebaum <sup>1, 2\*</sup>, Ann-Kathrin Beck <sup>2</sup>, Dorian De la Fuente <sup>1</sup>, Julia Karbach <sup>1</sup>, Ulrike Basten

<sup>1</sup>

<sup>1</sup> Department of Psychology, RPTU Kaiserslautern-Landau, Landau, Germany, <sup>2</sup> Center for Cognitive Science, RPTU Kaiserslautern-Landau, Kaiserslautern, Germany

Previous studies suggest that different emotion regulation (ER) strategies vary in the effectiveness with which they reduce certain components of an emotional response. In this study, we investigate how individual differences in the effectiveness of distraction and reappraisal are related to differences in (a) executive functions (EF) and (b) the selection of these strategies in adaptation to context factors like stimulus intensity. In a non-clinical sample of N = 220 participants, we studied ER with an ER implementation and an ER selection task. For the ER implementation task, we analyzed individual differences in the capacity to reduce the amplitude of the late positive potential (LPP) in EEG with reappraisal vs. distraction. This measure of ER capacity was related to (a) experimental measures of EF (inhibition, shifting, updating) and (b) the individual tendency to choose reappraisal vs. distraction as regulation strategy for emotional stimuli of high vs. low intensity. We found that the individual tendency for reappraisal was associated with an ER capacity advantage for reappraisal. This association was observed for subjective ratings of affective state as well as for the LPP amplitude - and especially for high intensity stimuli. Further analyses relate individual differences in ER capacity and tendency to differences in EF. Our findings suggest that people favor the ER strategies that help them personally best – both subjectively and objectively. The talk will discuss implications for mental health and related interventions.

**Keywords:**

**Presentation type:** Original Research Talk

**Session:** Emotion regulation: Neural underpinnings and associations with executive functions

# FROM METAL TO MIND: THE PURSUIT OF HUMAN-LIKENESS IN HUMAN-ROBOT INTERACTION

---

## Belief in Human Nature Uniqueness as a Framework for Emerging Technologies

Grzegorz Pochwatko <sup>1</sup>, Jakub Możaryn <sup>2\*</sup>, Monika Różańska-Walczuk <sup>2</sup>, Jean-Christophe Giger <sup>3</sup>

<sup>1</sup> *Institute of Psychology, Polish Academy of Science, Poland*, <sup>2</sup> *Institute of Automatic Control and Robotics, Warsaw University of Technology, Poland*, <sup>3</sup> *Department of Psychology and Educational Sciences, University of Algarve, Portugal*

The concept of belief in the uniqueness of human nature (BHNU) can serve as a valuable framework for understanding and guiding the development of new technologies such as collaborative robotics, virtual reality (VR) and artificial intelligence (AI). The BHNU measure, which assesses how strongly individuals believe in the uniqueness of human qualities, can predict resistance or acceptance of these technologies. By integrating the BHNU scale and the NARS scale into the design and development process, developers can better anticipate which aspects of VR and AI may trigger negative reactions based on perceived encroachment on human uniqueness. For example, AI systems designed to mimic human decision-making, or VR experiences that replicate human presence, could be more favourably received if insights from BHNU ratings guide their development. This approach allows for a more thoughtful integration of human-centred values into technology, ensuring a balance between innovation and societal acceptance.

references

[1] Pochwatko, G., et al. (2023, December). Social Representation of Robots and Its Impact on Trust and Willingness to Cooperate. 10.1007/978-3-031-66594-3\_23

[2] Różańska-Walczuk, M. (2022, December). Collaborative Robotics. Safety and Ethical Considerations. 10.1007/978-3-031-37649-8\_26

[3] Piçarra, N., et al. (2016). Designing social robots for interaction at work: Socio-cognitive factors underlying intention to work with social robots. DOI: 10.14313/JAMRIS\_4-2016/28

[4] Pochwatko, G. et al. (2015). Polish version of the negative attitude toward robots scale. DOI: 10.14313/JAMRIS\_3-2015/25

**Keywords:** Human-Robot interaction, Technology acceptance

**Presentation type:** Original Research Talk

**Session:** From metal to mind: The pursuit of human-likeness in human-robot interaction

---

## Negotiating the Uncanny Valley

Roger Moore \*

*University of Sheffield*

The term 'uncanny valley' was coined by Masahiro Mori in 1970 to describe the observation that near-human artefacts (such as a prosthetic hand) can trigger feelings of eeriness and repulsion in the viewer. A classic example is 'Polar Express', the 2004 animated feature film starring Tom Hanks, in which several of the characters (whose movements were derived using motion capture) are perceived by some observers as strange and uncanny. In science and engineering the uncanny valley has become of increasing relevance to character animation in computer games and to the appearance and behaviour of humanoid robots (such as Geminoid F), where the agents are sometimes perceived as being weird or creepy. Of course, the uncanny valley has been the subject of numerous scientific investigations. However, while some studies confirm its existence, others don't find any evidence for it at all! Also, many of the theories about the effect are qualitative rather than quantitative. This paper shows, using a Bayesian model of categorical perception, how differential distortion caused by stimuli containing conflicting perceptual cues can give rise to tension in the region of a category boundary that serves to provide a potential quantitative explanation of the uncanny valley effect. The paper also shows how different observers could have different responses to the same stimuli, and concludes with some suggestions as to how the uncanny valley might be avoided in the design of future robots and autonomous agents by taking care to align the artefact's visual, vocal, cognitive and behavioural affordances.

**Keywords:** uncanny valley, categorical perception, category boundary, aligned affordances

**Presentation type:** Original Research Talk

**Session:** From metal to mind: The pursuit of human-likeness in human-robot interaction



## **Bridging the gap. Replication of the spatial distance compression effect with social robots**

Katharina Kühne <sup>1\*</sup>, Anika Tappert <sup>1</sup>, Melinda A. Jeglinski-Mende <sup>1</sup>, Yuefang Zhou <sup>1</sup>, Oliver Bendel <sup>2</sup>,  
Martin H. Fischer <sup>1</sup>

<sup>1</sup> *Division of Cognitive Sciences, University of Potsdam, Potsdam, Germany*, <sup>2</sup> *FHNW School of Business, Windisch, Switzerland*

As robots become increasingly integrated into human interactions, it is important to understand whether humans perceive them as more human-like or machine-like. Previous research has demonstrated that individuals observing two humans facing each other from a third-person perspective perceive a reduced distance between them, a phenomenon known as the spatial distance compression effect, which is attributed to the automatic attribution of social interaction between these humans. Our study replicates the effect in human-human dyads with a new method and investigates whether it extends to human-robot interactions. In an online experiment, 49 participants estimated distances between two humans and between a human and a robot, with the actors either facing each other or standing back-to-back. Data were analyzed using the method of constant stimuli and the point of subjective equality. The results revealed significant spatial distance compression in both human-human and human-robot dyads when the participants viewed the actors face to face, suggesting that human-robot dyads are similarly perceived as interactive and social.

**Keywords:** Human-Robot Interaction, Social perception, Social robots, Spatial distance compression

**Presentation type:** Original Research Talk

**Session:** From metal to mind: The pursuit of human-likeness in human-robot interaction

## **Beyond embodiment: Simple behavioral cues always affect our perception of robot agents**

Jan Pohl <sup>1\*</sup>, Kristina Nikolovska <sup>2</sup>, Francesco Maurelli <sup>2</sup>, Arvid Kappas <sup>2</sup>, Bernhard Hommel <sup>3</sup>

<sup>1</sup> *Technische Universität Dresden*, <sup>2</sup> *Constructor University*, <sup>3</sup> *Shandong Normal University*

In the literature there is extensive evidence for the impact of a robot's appearance on how people perceive and attribute it. There is also evidence that simple behavioral characteristics (e.g., movement) can have strong impact on people's attributions. However, few studies have compared how different robot appearances affect these perceptions. We aimed to address this gap by exploring whether, independently of their physical form, robots exhibiting efficient movements are perceived differently in regard to e.g., social and mind or selfhood-attribution (as compared to an inefficient robot). Our hypotheses were that (H1) the robot's behavior will affect the attribution as measured by Godspeed Scale (GS), Mind Attribution Scale (MAS) and Robotic Social Attributes Scale (RoSAS) and that (H2) this pattern will be consistent across different robot embodiments (NAO, Duckiebot and Sphero BOLT). H1 was confirmed partly for all robot types in ANOVAs: while showing efficient behavior as compared to inefficient behavior did increase ratings (significant interaction), post-hoc paired t-tests revealed that this was only the case for the subscales perceived intelligence (found in GS) and competence (found in RoSAS). H2 was confirmed with a Bayesian model comparison, showing strong evidence against an effect of the robots' physical form on the interaction of behavior and attribution. These findings suggest that movement behaviors can significantly influence people's perceptions of robots independently of the robot's specific embodiment. This highlights the importance that simple behavioral cues have on our attribution of other agents.

**Keywords:** hri, robot, embodiment, humanoid, non-humanoid, attribution

**Presentation type:** Original Research Talk

**Session:** From metal to mind: The pursuit of human-likeness in human-robot interaction

## Talking Robots: (De-)Synchronization of Verbal and Visual Attributes through the Lens of Humans

Bing Li <sup>1, 2\*</sup>, Tatjana Nazir <sup>1, 2</sup>

<sup>1</sup> CNRS, UMR 9193, F-59000 Lille, France, <sup>2</sup> FR 2052 SCV, Tourcoing, France

People typically expect social agents' verbal utterances to be congruent with their physical appearances. However, given the vast diversity in robot appearances, expectations for each robot can vary widely, making it impractical to constrain a robot's topics of conversation. We propose a solution that allows building “body images” for robots using a free word association task (Li et al., 2023). By feeding words associated with a robot into a large language model (LLM), we created unique body images for two robots, Buddy and Atlas. These body images affected the way the robot interacted with a human. Our method provided each robot with a verbal interaction style that aligned with their physical appearances and human social expectations.

We present results showing how extended verbal interaction with these robots changes people's ratings of the robots on several anthropomorphic dimensions. Hence, expectations for how a robot will act can affect the way people respond to the robot. For instance, a body image based on words associated with the large humanoid resulted in higher perceived humanness scores (see Ho & MacDorman, 2010) than a child-like body image - regardless of the robot's physical appearance. Counterintuitively, when there is a mismatch between body image and appearance, people tend to attribute higher animacy (see Spatola, Kühnlenz, & Cheng, 2021) to the robot. These results demonstrate the potential for improving human-robot interaction by integrating a body image empowered by LLM and real human data.

**Keywords:** body image, embodiment, word association, large language model, human-robot interaction

**Presentation type:** Original Research Talk

**Session:** From metal to mind: The pursuit of human-likeness in human-robot interaction

# COGNITIVE-MOTOR INTERFERENCE: HOW COGNITIVE PROCESSING DEMANDS CAN AFFECT POSTURAL CONTROL PROCESSES

---

## Event-related analysis of postural control and cognitive conflict in the Flanker Task

Anton Koger <sup>1</sup>, Leif Johannsen <sup>1</sup>, Andrea Kiesel <sup>2</sup>, Hermann Müller <sup>3</sup>, Denise Stephan <sup>1</sup>, Elisa Straub  
<sup>2\*</sup>, Iring Koch <sup>1</sup>

<sup>1</sup> *Cognitive and Experimental Psychology, Institute of Psychology, RWTH Aachen University, Aachen, Germany,* <sup>2</sup> *Department of Psychology, University of Freiburg, Freiburg, Germany,* <sup>3</sup> *Department of Sport Science, University of Gießen, Gießen, Germany*

Cognitive-motor interference has been extensively studied, yet our understanding of their interaction remains complex and varied. The present study examines the relationship between cognitive conflict induced by the Flanker Task and postural control measured by a force plate. In Experiment 1 (N = 69) we presented an equal number of congruent and incongruent Flanker stimuli (letter version of the Flanker Task) to participants while they were standing on a force plate. Secondly, (Experiment 2, (N = 65), the proportion of incongruent to congruent Flanker stimuli was manipulated across blocks, including both 75/25 and 25/75 ratios (proportion congruency manipulation). We examined reaction times in the cognitive task and analyzed postural sway variability data from the force plate with an event-related approach (i.e., continuous force-plate data were analyzed through cluster-based permutation tests). The expected congruency effect on reaction times was confirmed, along with a modulation of this effect based on the proportion congruency manipulation (i.e., larger congruency effects in the condition with 25% incongruent and 75% congruent trials). Cluster-based permutation analysis of postural control revealed a congruency-specific effect on sway variability after stimulus presentation in the first Experiment. Sway variability was reduced in congruent compared to

incongruent trials when they followed congruent trials. There was also a general increase in sway variability following both, congruent and incongruent stimuli presentations (i.e., after target onset). These findings highlight the interplay between cognitive conflict and postural control, suggesting that postural adjustments are sensitive to cognitive demands.

**Keywords:** flanker task, cognitive conflict, congruency effect, postural control, sway variability

**Presentation type:** Original Research Talk

**Session:** Cognitive-motor interference: How cognitive processing demands can affect postural control processes

---

## Exploring the Dynamics of Postural Stability During Egocentric Mental Rotation Tasks with Multi-Axial Figure Rotations

Philipp Hofmann \*, Petra Jansen

*University of Regensburg, Faculty of Human Sciences*

Mental rotation refers to the ability to visualize objects being rotated in one's mind. A specific form of this is egocentric mental rotation, where participants are shown a figure with a distinguishing feature on one side. They are asked to identify whether the feature is on the right or left side. It is believed that this task involves the observer imagining themselves rotating within the environment to make the judgment. Given the known link between mental and motor rotations, and the connection between mental rotation ability and postural stability, this study explores whether the trajectory of the center of pressure course over time, indicating postural stability, changes during egocentric tasks involving human figures rotated along the x-, y- and z-axis (only one axis at a time). To examine this, center of pressure parameters are recorded while participants stand on a force plate (AMTI OR6-2000, 1000 Hz) and engage in a dual-task design, solving egocentric mental rotation tasks using human figures as stimuli. A two-factor repeated measures ANOVA using the factors "axis of rotation" (x,y,z) and "rotation angle" (0°, 60°/300°, 120°/240°, 180°) will be calculated for each postural stability parameter. The final sample size of N = 105 was calculated using G-Power. Data collection is ongoing, and results will be available before the conference. The study is pre-registered on osf.io. Insights from this research will contribute to understanding the motor processes underlying mental rotation and emphasize the role of embodiment.

**Keywords:** postural stability, mental rotation, dual-task

**Presentation type:** Original Research Talk

**Session:** Cognitive-motor interference: How cognitive processing demands can affect postural control processes

---

## **forceplate: An R package for processing raw force-plate data**

Raphael Hartmann <sup>1\*</sup>, Anton Koger <sup>2</sup>, Elisa Straub <sup>1</sup>, Leif Johannsen <sup>2</sup>, Iring Koch <sup>2</sup>, Denise Stephan <sup>2</sup>, Hermann Müller <sup>3</sup>, Andrea Kiesel <sup>1</sup>

<sup>1</sup> *University of Freiburg*, <sup>2</sup> *RWTH Aachen University*, <sup>3</sup> *University of Giessen*

Research increasingly supports the interaction between cognitive and motor processes, yet traditional methods for analyzing postural control data often aggregate data over extended periods, making it difficult to capture the effects of individual cognitive events. Our recently developed R package *forceplate* offers a novel, event-related approach to analyze how cognitive tasks impact postural control at finer temporal scales using force-plate data. The *forceplate* package processes continuous force and moment data from the force plate across three spatial dimensions, segmenting these time series into trials aligned with discrete cognitive events. Users can apply a low-pass filter to mitigate artifacts such as muscle twitches or electrical noise and perform baseline corrections to standardize data across trials. With the package, users can define specific time bins around events (e.g., stimulus presentation or response onset) to calculate descriptive statistics like mean, and standard deviation for each trial's time-series data. The output is a structured dataset with one or more measures per trial, depending on the number of user-defined time bins, that is readily compatible with further analyses, such as (mixed-effects) analysis of variance. By standardizing and simplifying the preprocessing of force-plate data for cognitive research, *forceplate* aims to improve reproducibility and comparability across studies. This R package thus provides a comprehensive tool for researchers seeking to explore cognitive-motor interactions on smaller time scales, contributing to standardized methodologies in the field.

**Keywords:** R-package, force-plate, event-related

**Presentation type:** Original Research Talk

**Session:** Cognitive-motor interference: How cognitive processing demands can affect postural control processes

---

## **Interference between cognitive conflict resolution and control of standing balance**

Leif Johannsen <sup>1\*</sup>, Hermann Müller <sup>2</sup>, Andrea Kiesel <sup>3</sup>, Iring Koch <sup>1</sup>

<sup>1</sup> *Cognitive and Experimental Psychology, Institute of Psychology, RWTH Aachen University, Aachen, Germany,* <sup>2</sup> *Department of Sport Science, University of Gießen, Gießen, Germany,* <sup>3</sup> *Department of Psychology, University of Freiburg, Freiburg, Germany*

Traditional general resource sharing accounts of cognitive-balance interference fall short of a mechanistic explanation of these phenomena. Therefore, it is necessary to capture the microstructure of interference in multitasking situations involving body balance control. Assuming that interference between the cognitive and balance domain is caused by “micro-bottlenecks”, we applied a methodological approach that allows the evaluation of intermittent crosstalk between cognition and balance control based on single cognitive events such as the processing of individual cognitive stimuli and response selection. In this talk, we present data from a within-subject experiment that contrasts two types of cognitive conflict with respect to their impact on short-term balance control. Cognitive-balance interference effects in a traditional Simon task with characters as targets presented laterally, which causes overlap between a target’s distractor dimension (spatial location of the target) and the manual responses, will be evaluated against a spatial Stroop task, that increases spatial overlap of the primary target dimension with the overlap between distractor dimension and responses. Preliminary results of an ongoing study will be discussed.

**Keywords:** body balance control, cognitive control, multitasking

**Presentation type:** Original Research Talk

**Session:** Cognitive-motor interference: How cognitive processing demands can affect postural control processes

## Assessing the influence of cognitive dual-task demands on postural control: An event-related approach using cluster-based permutation analysis

Anton Koger <sup>1\*</sup>, Leif Johannsen <sup>1</sup>, Andrea Kiesel <sup>2</sup>, Hermann Müller <sup>3</sup>, Denise N. Stephan <sup>1</sup>, Elisa R. Straub <sup>2</sup>, Iring Koch <sup>1</sup>

<sup>1</sup> RWTH Aachen University, <sup>2</sup> University of Freiburg, <sup>3</sup> University of Gießen

Cognitive-processing demands can affect postural control processes. Traditional methods of analyzing postural control aggregate sway data, making it difficult to isolate specific influences of cognitive processes. In the present study, an event-related methodology is used during a cognitive dual task to explore how cognitive processes influence postural control processes. The dual task comprises a visual-vocal short-term memory task with a delayed vocal response and an auditory-manual reaction time (RT) task. We manipulated the stimulus onset asynchrony (SOA; 100 vs. 1,000 ms) between the stimuli (Experiment 1) and whether participants had to report or ignore the visual object (task load: ignore vs. report; Experiment 2). These were applied on a trial-by-trial basis or in blocks of predictable versus unpredictable task load (Experiment 3). RTs in the auditory-manual task were longer during short SOA compared to long SOA, suggesting a bottleneck caused by encoding the visual object for later report. This effect disappeared in predictable ignore-trials, when the visual object was never relevant. To assess postural correlates, we analyzed continuous force-plate data using cluster-based permutation analysis, providing a sensitive and precise approach. This analysis revealed no process-specific influence of SOA on postural control processes, but a reduction of sway variability after visual target onset in report but not in ignore trials. Moreover, a difference in sway variability over the course of a trial in report vs. ignore trials occurred in predictable blocks only. The data suggest a bottleneck between memory-consolidation processes and postural control adjustments.

**Keywords:** postural control, cognitive control, cognitive-motor interference, dual task, event-related, cluster-based permutation analysis

**Presentation type:** Original Research Talk

**Session:** Cognitive-motor interference: How cognitive processing demands can affect postural control processes



## AUDITORY COGNITION IN INTERACTIVE VIRTUAL ENVIRONMENTS

---

### Auditory and audiovisual time-to-collision estimation and road-crossing judgments

Daniel Oberfeld-Twistel \*, Thirsa Huisman

*Allgemeine Experimentelle Psychologie, Johannes Gutenberg-Universität Mainz*

Pedestrians can only safely cross the road before an approaching vehicle if the time remaining until the vehicle arrives at their position (time-to-collision, TTC) is longer than the time needed for crossing. Using a virtual-reality system that combines physically plausible acoustic simulations of approaching vehicles with visual simulations, we are investigating how the vehicle sound affects the perception and behavior of pedestrians in a road-crossing situation. This talk presents an overview of our research approach and of key findings from the first phase of the AUDICTIVE priority program. One series of experiments studied the effects of vehicle source intensity on TTC estimation and the riskiness of street-crossing decisions, indicating potential risks associated with quieter vehicles. A second series focuses on interactions between pedestrians and accelerating vehicles. When the sound of an accelerating conventional vehicle (ICEV) is presented, this largely removes the inadequate consideration of acceleration observed in visual-only TTC estimation. However, for electric vehicles with and without AVAS (acoustic vehicle alerting system), this benefit provided by the car sound is significantly reduced compared to ICEVs, and riskier crossing decisions are observed. Implications for the design of AVAS sounds are discussed.

**Keywords:** street crossing, time-to-collision estimation, auditory, visual, multisensory, pedestrian safety, motion perception

**Presentation type:** Original Research Talk

**Session:** Auditory cognition in interactive virtual environments

## Memory and listening effort in conversations: The role of spatial position, visual cues, and cognitive functions

Chinthusan Mohanathasan <sup>1\*</sup>, Jonathan Ehret <sup>2</sup>, Cosima A. Ermert <sup>3</sup>, Plamenna B. Koleva <sup>1</sup>, Andrea Bönsch <sup>2</sup>, Janina Fels <sup>3</sup>, Torsten W. Kuhlen <sup>2</sup>, Sabine J. Schlittmeier <sup>1</sup>

<sup>1</sup> *Work and Engineering Psychology, RWTH Aachen University, Jägerstraße 17 - 19, 52066 Aachen, Germany*, <sup>2</sup> *Visual Computing Institute, RWTH Aachen University, Kopernikusstraße 6, 52074 Aachen, Germany*, <sup>3</sup> *Institute for Hearing Technology and Acoustics, RWTH Aachen University, Kopernikusstraße 5, 52074 Aachen, Germany*

Listening to a conversation between two talkers and intending to remember the content later is a common situation. However, in cognitive-psychological research on verbal short-term memory, the standard stimulus material consists of unrelated words or isolated sentences. When connected sentences are employed in experimental studies, which is rather uncommon, diotic sound presentation is used without visual cues from the talkers. In the present studies, we investigated whether the spatial position of two talkers and static or animated faces as visual cues can reduce listening effort and improve memory of the conversation's content. In a series of three experiments, participants completed a dual-task paradigm that comprised a primary listening task in which a conversation between two conversing talkers was presented. In Experiment 1 ( $n = 29$ ), the audio signals of the two talkers were presented via headphones, either spatially separated ( $\pm 60^\circ$ ) or co-located ( $0^\circ$ ). In Experiment 2 ( $n = 30$ ), static faces and in Experiment 3 ( $n = 28$ ), animated faces were presented on computer screens and the corresponding audio signals were played through spatially separated ( $\pm 30^\circ$ ) loudspeakers. Parallel to the primary listening task, a vibrotactile pattern recognition task was administered as a secondary task to measure listening effort. In all experiments, we assessed working memory capacity, attention, and processing speed to account for person-specific factors, included as covariates, in the data analysis. We discuss our findings on the role of spatial auditory and visual cues on listening effort and short-term memory in conversations.

**Keywords:** dual-task, short-term memory, listening effort, spatial auditory cues, visual cues, cognitive functions

**Presentation type:** Original Research Talk

**Session:** Auditory cognition in interactive virtual environments

## Neural processing of auditory position changes in azimuth and distance: Comparing findings from a real and a virtual room across age groups

Benjamin Stodt <sup>1\*</sup>, Daniel Neudek <sup>2</sup>, Rainer Martin <sup>2</sup>, Stephan Getzmann <sup>1</sup>

<sup>1</sup> *Leibniz Research Centre for Working Environment and Human Factors (IfADo), Dortmund, Germany,* <sup>2</sup> *Institute of Communication Acoustics, Ruhr-Universität Bochum, Bochum, Germany*

Virtual reality (VR) allows neurocognitive research in more life-like, ecologically valid settings. However, it is essential to verify that VR results align with those from real-world or laboratory conditions. In this study, we examined the detection of auditory position changes in a real and virtual environment among younger and older participants. Alongside behavioral measures, event-related potentials (ERPs) from the EEG were derived.

A total of 22 younger (M=24.00 years) and 22 older participants (M=64.77 years) engaged in experiments on separate days in two environments: a real reverberant laboratory environment with physical loudspeakers and a virtual twin of this room (presented via head-mounted display and headphones). In an auditory change detection (“oddball”) task, a broadband sound was regularly emitted from a central loudspeaker in front of the participants. Using a joystick, participants had to respond whenever the sound position shifted to one of four target loudspeakers positioned near/far (distance dimension) or to the left/right of the center position.

Regardless of environment and age, position changes in azimuth were detected more accurately than in distance. Across both environments, expected ERPs, representing neurocognitive correlates of deviance detection and attentional orientation (mismatch negativity and P3b), were observed. However, characteristics of these components partially varied depending on the environment, target dimension, and age group.

In general, comparable results were observed in both virtual and real environments, indicating VR as a suitable tool for auditory tasks in more life-like scenarios. Further research should investigate more complex audio-visual scenarios using VR.

**Keywords:** Mismatch negativity, P3b, event-related potentials, auditory processing, oddball, aging, virtual reality

**Presentation type:** Original Research Talk

**Session:** Auditory cognition in interactive virtual environments

## EEG-based cortical speech tracking of unscripted, natural speech

Mareike Daeglau <sup>1</sup>, Moritz Bender <sup>2</sup>, Jürgen Otten <sup>2</sup>, Giso Grimm <sup>2</sup>, Volker Hohmann <sup>2</sup>, Stefan Debener <sup>1\*</sup>

<sup>1</sup> *Department of Psychology, University of Oldenburg*, <sup>2</sup> *Department of Medical Physics and Acoustics, University of Oldenburg*

Speech and language research, such as auditory attention decoding (AAD) to speech streams, has traditionally relied on scripted stimuli from professional speakers, often involving passive listening tasks. We investigate audiovisual speech tracking and auditory attention using natural, unscripted stimuli to reflect natural listening demands better. We use electroencephalography (EEG) and other physiological measures in telepresence and virtual listening scenarios to investigate cortical speech tracking derived from the correlation of scalp EEG and speech envelope time series data.

We will report the results of several studies. In one study we used unscripted natural speech stimuli from six speakers and found clear evidence for cortical speech tracking. Interestingly, specific speech features, such as pitch variability and rhythm, can significantly enhance the magnitude of cortical speech tracking. The subsequent analysis included likeability ratings of the different speakers. Significant correlations between liking and cortical speech tracking suggest a link between subjective preferences and attentional processing of speech. Our work demonstrates the value of EEG-based cortical speech tracking in virtual environments to understand what factors influence listening and how listeners cope with natural variations in communication scenarios.

**Keywords:** EEG, cortical speech tracking, natural listening

**Presentation type:** Original Research Talk

**Session:** Auditory cognition in interactive virtual environments

## How affective sound influences the perception of distance in Virtual Reality

Leon Krocze<sup>1\*</sup>, Sarah Roßkopf<sup>1</sup>, Felix Stärz<sup>2</sup>, Matthias Blau<sup>2,3</sup>, Steven van de Par<sup>3,4</sup>, Andreas Mühlberger<sup>1</sup>

<sup>1</sup> *Department of Psychology, Clinical Psychology and Psychotherapy, Regensburg University,* <sup>2</sup> *Institut für Hörtechnik und Audiologie, Jade Hochschule,* <sup>3</sup> *Cluster of Excellence Hearing4All,* <sup>4</sup> *Acoustics Group, Carl von Ossietzky University*

Affective stimuli in our environment indicate threat or reward and have been shown to bias perception and behavior. While studies with visual stimuli found that threatening objects were perceived to be closer or bigger than neutral stimuli, it remains unclear whether similar biases exist in the auditory domain. Therefore, the goal of this study was to investigate how affective sound stimuli influence sound distance perception. Two Virtual Reality experiments were conducted in which affective voices (angry vs. neutral) were presented via loudspeakers at positions unknown to the participants and had to be localized in a virtual environment. In the first experiment (N = 44), participants actively placed a visually presented virtual agent or virtual loudspeaker in an empty room at the perceived sound source location. In the second experiment (N = 32), participants were standing in front of several virtual agents or virtual loudspeakers and had to indicate the sound source by directing their gaze toward the perceived sound location. Results in both preregistered experiments consistently show that participants estimate the location of angry voice stimuli at greater distances than the location of neutral voice stimuli. We discuss that neither emotional nor motivational biases can account for these results. Instead, distance estimates seem to rely on listeners' representations regarding the relationship between vocal affect and acoustic characteristics.

**Keywords:** Distance Perception, Virtual Reality, Emotion, Spatial Audio, Eye Tracking

**Presentation type:** Original Research Talk

**Session:** Auditory cognition in interactive virtual environments

# ABSTRACT REPRESENTATIONS IN NEURAL ARCHITECTURES: FROM HUMAN COGNITION TO ARTIFICIAL INTELLIGENCE

---

## Computational Modeling of the Development of Abstract Object Representations

Jochen Triesch \*

*Frankfurt Institute for Advanced Studies, Goethe University Frankfurt*

What are the origins of abstract knowledge about objects? Infants and toddlers learn about objects quite differently from today's artificial intelligence systems. Here we aim to better understand these processes by developing computational models of how infants and toddlers acquire abstract object representations and the ability to recognize objects and object categories independent of viewpoint, distance, etc. For this, we have developed novel learning approaches for deep neural networks that exploit the temporal and/or multimodal structure of sensory information during extended interactions with objects. For example, we harness head-mounted eye tracking in toddlers and train computational models with toddlers' first person visual input, demonstrating that strong object representations can result from just minutes of such experience. Furthermore, we highlight the benefits of toddlers' gaze behavior for successful learning. We also consider learning in models receiving computer rendered visual inputs, where we can precisely control the input statistics. We show how additional linguistic input, even if rare and noisy, promotes the formation of abstract object categories. Furthermore, we demonstrate how our time-based learning approach can lead to the emergence of very abstract concepts such as „kitchen object“ or „garden object“. Finally, we study the role of behavior and knowledge of executed manipulation actions (e.g. how an object was turned) and demonstrate how this additional information can further enrich the learned representations. Overall, we elucidate what computational principles seem to underlie the emergence of abstract object representations in infants and toddlers.

**Keywords:** object perception, computational model, abstract representation

**Presentation type:** Original Research Talk

**Session:** Abstract representations in neural architectures: From human cognition to artificial intelligence

## Representations of hierarchical scene information in the brain

Victoria Nicholls <sup>1\*</sup>, Lea Widmayer <sup>1</sup>, Melissa Võ <sup>1, 2</sup>

<sup>1</sup> *Goethe University Frankfurt, Department of Psychology, Scene Grammar Lab*, <sup>2</sup> *Neuro-Cognitive Psychology, Department of Psychology, LMU Munich*

Our knowledge of scenes is thought to have a hierarchical structure: at the lowest level are often smaller, local objects e.g. a soap, followed by so-called “anchors”, often larger objects like a sink. Together they form a “phrase”, a meaningful and functionally organized sub-set of a scene. Multiple phrases combined form a scene. What has not been established so far is whether this hierarchical scene knowledge is represented on a neural level, which brain regions might be involved, and the dynamics of accessing this knowledge. To examine this, participants were presented with an isolated object (local or anchor) either as a word label, image, or target word in the context of a search task, followed by a blank period while we recorded MEG. During the blank period participants were instructed to imagine the object. Using representational similarity analysis (RSA) with models representing the different levels of scene knowledge, we analysed each stimulus presentation and blank period to determine whether participants access representations about the objects only, or additionally access phrase and scene representations. During the stimulus period we found peaks for object, phrase, and scene category models from 100-200ms post-stimulus onset. During the blank period we found no such peaks. This suggests that even when seeing isolated objects participants automatically access also representations of scene and even phrasal information. This implies automatic representations of functional groupings of objects within scenes that may not be maintained in working memory if not immediately required by the task.

**Keywords:**

**Presentation type:** Original Research Talk

**Session:** Abstract representations in neural architectures: From human cognition to artificial intelligence

## Large language models as artificial semantic annotators

Emin Çelik \*, Mariya Toneva

*Max Planck Institute for Software Systems Saarbrücken, Germany*

Comprehensive study of how the semantic representation of a word changes with context via human behavior or brain recordings is difficult due to the sheer number of possible contexts. Here, we considered large language models (LLMs) as a model organism that is tasked with assessing word meaning. As a first step, we tested whether LLMs can rate a large set of individual words across a number of semantic properties similarly to the way humans do. The words included abstract and concrete nouns, verbs, and adjectives. The semantic properties also covered a wide range, from sensory and motor to social and emotion-related properties. Specifically, we used GPT-4 Turbo and Llama3.1-8B to produce such ratings by using prompts that mimicked the original queries presented to human raters. The prompts additionally included a few words and their corresponding ratings to facilitate accurate rating generation. We found that there was a close match between these rating estimates and those produced by humans. Overall, our results suggest that LLMs are useful tools to semantically annotate a large pool of words out-of-context. In the future, we plan to use our method to annotate a whole book with words in context and model fMRI and MEG data while subjects listen to this audiobook.

**Keywords:** LLMs, semantics, concrete, abstract, annotation

**Presentation type:** Original Research Talk

**Session:** Abstract representations in neural architectures: From human cognition to artificial intelligence



## Eye gaze patterns and reinstatement in children, adults and artificial intelligence models during naturalistic viewing

Iryna Schommartz <sup>1, 2\*</sup>, Bhavin Choksi <sup>3</sup>, Gemma Roig <sup>3, 4</sup>, Yee Lee Shing <sup>1, 2</sup>

<sup>1</sup> Department of Psychology, Goethe University Frankfurt, <sup>2</sup> IDeA – Center for Individual Development and Adaptive Education, <sup>3</sup> Computer Science Department, Goethe University Frankfurt, <sup>4</sup> Center for Brains Minds and Machines, Massachusetts Institute of Technology

In developmental research, differences in cognition and perception during image viewing can result in varied processing and subsequent memory of scene elements. Additionally, scan paths during scene perception may provide insights into pattern completion for partially incomplete images. However, the extent to which eye-gaze patterns predict subsequent memory and how these patterns differ between children and adults remains unclear.

To investigate this, we measured the gaze fixations while children (aged 6 to 11) and young adults (aged 19 to 30) viewed 60 naturalistic images. Later, gaze fixations were measured during image reinstatement on the blank screen after being cued with partially occluded images.

Using the representational similarity analysis of the fixation-based heat maps, we observed that adults exhibited higher encoding-retrieval eye-gaze reinstatement than children, suggesting a prolonged developmental trajectory for eye-gaze reinstatement. It correlated with greater memory accuracy, reflecting the consolidation of scan paths.

Further, we analyzed the differences between the scan paths in children and adults using MultiMatch—a metric measuring the similarity between scan paths across multiple dimensions. We observed consistent differences between the scan paths made by adults and children.

We also used various state-of-the-art AI models to uncover further if they can preferentially predict the scanpaths of an age group. We aim to thoroughly investigate and discuss our findings, and their implications for both, cognitive neuroscience as well as for building foveation-based AI models.

**Keywords:** eye tracking, gaze reinstatement, AI models, eye gaze patterns

**Presentation type:** Original Research Talk

**Session:** Abstract representations in neural architectures: From human cognition to artificial intelligence

## ORIGINAL RESEARCH TALKS

### Can community notes serve as retraction on social media platforms?

#### Studying the continued influence effect on social media

Nicole Antes <sup>1\*</sup>, Martina Gierlich <sup>2</sup>, Anastasia Kozyreva <sup>3</sup>, Nadia Said <sup>2</sup>

<sup>1</sup> *Leibniz-Institut für Wissensmedien, Tübingen*, <sup>2</sup> *University of Tübingen*,

<sup>3</sup> *Max Planck Institute for Human Development, Berlin*

The persistent belief in misinformation despite correction, known as the Continued Influence Effect (CIE), is a major challenge for interventions that aim to mitigate risks from harmful content. Social media plays a crucial role in spreading misinformation, but also in its correction. A promising approach to mitigate the influence of misinformation are community notes, a crowd-sourced fact-checking tool implemented by X. Community notes provide corrective context directly with the tweet containing the misinformation. This study investigates whether community notes are perceived as correction and whether they could reduce the continued use of misinformation across neutral and socially relevant content. To this end, N = 542 participants from a quota-based German sample (age, gender) read short narratives presented as tweets with neutral (e.g., food recall) or socially relevant content (e.g. gender quota) in a realistic social media environment. Within each narrative one tweet contained the misinformation and was later presented a second time alongside a community note. The community note contained either a simple retraction of the misinformation or the correction with an alternative explanation. For neutral content, we replicated the typical CIE pattern where a retraction including an alternative explanation was most effective in reducing CIE, followed by a simple retraction. For socially relevant content, community notes only reduced the continued use of misinformation when providing a retraction with an alternative explanation. These findings suggest that community notes can reduce the influence of misinformation on social media, although their effectiveness may be moderated by ideological factors in socially relevant contexts.

**Keywords:** continued influence effect, community notes, social media, misinformation, correction

**Presentation type:** Original Research Talk

## Operant conditioning of planaria in the water-droplet paradigm

Sarah Sophie Anton <sup>1\*</sup>, Jannes Freiberg <sup>1, 2</sup>

<sup>1</sup> Christian-Albrechts-Universität zu Kiel, <sup>2</sup>CRC 1461

The process of learning, defined as a change in behavior due to experience, is a fundamental mechanism by which organisms adapt to their environment. Still little is known about the underlying neuronal mechanisms involved in learning. Therefore, less complex model organisms are crucial to deepen the understanding of learning processes. Numerous studies use planarians because of their remarkable regenerative abilities and their relatively simple nervous system. The prevailing view in the literature of the last 50 years suggests that planarians, such as *Girardia tigrina*, are capable of associative learning, including classical conditioning and operant conditioning. However, there have always been studies that have yielded inconsistent results or question the associative learning abilities of planarians. To consolidate the findings on associative learning in planarians, this study introduces a novel operant conditioning training-technique, the water-droplet paradigm. In the experiment, the aquatic planarian is placed on a dry surface, with water serving as reinforcement for movement on the dry surface. Additionally, a second training group received delayed reinforcement during the first trial to investigate the impeding effects of delayed reinforcement. To investigate if *G. tigrina* possess a form of long-term memory, a follow-up trial was conducted 24 hours after the initial training. The findings of this study indicate that *G. tigrina* are capable of associative learning when water is used as reinforcement, and that delayed reinforcement impairs a learning effect. However, there was no evidence of long-term memory in *G. tigrina*, possibly due to an insufficient number of training sessions.

**Keywords:** planarians, associative learning, operant conditioning, delayed reinforcement, long-term memory

**Presentation type:** Original Research Talk

## The role of mental imagery in perception and working memory reconsidered

Elena Azañón <sup>1, 2\*</sup>, Zoë Pounder <sup>3</sup>, Alec Figueroa <sup>4</sup>, Reshanne R. Reeder <sup>5</sup>

<sup>1</sup> Medical Faculty, Otto von Guericke University Magdeburg, Germany, <sup>2</sup>Leibniz Institute for Neurobiology, Germany, <sup>3</sup>Department of Experimental Psychology, University of Oxford, UK, <sup>4</sup>Unaffiliated, <sup>5</sup>Department of Psychology, Institute of Population Health, University of Liverpool, UK

Mental imagery is traditionally considered crucial for perception and visual working memory, relying on precise visual representations. We conducted two studies to re-examine the role of imagery vividness and strategy use during visual tasks among individuals with varying imagery abilities, from aphantasia (absence of imagery) to hyperphantasia (extremely vivid imagery).

In a conceptual replication (n=185) and a direct replication (n=56), we revisited a 2007 study suggesting that vivid imagery increases interference in a modified Stroop task. Contrary to the original findings, we found no evidence that imagery vividness amplifies interference; all participants benefited when the color word and ink were congruent. Notably, individuals with prophantasia (projecting mental images externally) exhibited stronger congruency effects, indicating a unique interaction between mental imagery and perception.

In the second study (n=98), we examined strategy use in a visual working memory task involving gratings of varying orientation. Participants reported using five strategies: visual, spatial, verbal, semantic, and sensorimotor. Behavioral results showed that aphantasics performed similarly to typical imagers. While typical imagers predominantly used visuospatial strategies, aphantasics preferred non-visual spatial and sensorimotor strategies over verbal ones. This suggests non-visual strategies are sufficient and effective in tasks traditionally thought to require visual imagery. These findings prompt a reevaluation of the assumed central role of visual imagery in perception and working memory. They highlight the effectiveness of diverse cognitive strategies beyond the visual-verbal dichotomy and underscore the need for more inclusive models accounting for variability in human cognition.

**Keywords:** Visual imagery, aphantasia, hyperphantasia, working memory, Stroop test, mental strategies, visual gratings

**Presentation type:** Original Research Talk

## Shared and distinct representational dynamics of phonemes and prosody along dorsal and ventral speech streams

Seung-Cheol Baek <sup>1\*</sup>, Seung-Goo Kim <sup>1</sup>, Burkhard Maess <sup>2</sup>, Maren Grigutsch <sup>2</sup>, Daniela Sammler <sup>1, 2</sup>

<sup>1</sup> Max Planck Institute for Empirical Aesthetics, <sup>2</sup>Max Planck Institute for Human Cognitive and Brain Sciences

Phonemes and prosody are fundamental linguistic units for speech comprehension, each contributing to different linguistic meanings. Perceiving these linguistic units is thought to involve a serial transformation from acoustic to categorical representations through a cortical hierarchy organized into dorsal and ventral speech streams. However, the neural implementation of this perceptual process remains poorly understood, along with how it compares between phonemes and prosody, which emerge from distinct physical cues. To address these questions, we monitored 29 participants using magnetoencephalography during a psychophysical experiment with single words varying orthogonally in word-initial phonemes (“Bar” vs. “Paar”) and prosody (statement vs. question). Employing a novel approach that combined time-resolved representational similarity and multivariate transfer entropy analyses, we examined phonemic and prosodic representations at different abstraction levels in space and time, as well as their information flow. Our findings reveal that the abstraction of phonemic and prosodic information does not fully align with a serial hierarchical organization. Instead, we observed successive, yet joint and distributed processing of acoustic and categorical information—phonemes along the ventral stream and prosody along both dorsal and ventral streams. Notably, while acoustic representations of both linguistic units similarly spanned across bilateral temporal areas, their categorical representations exhibited distinct spatial extents. Specifically, phonemes were categorically represented locally in posterior temporal areas, whereas categorical representations of prosody extended broadly to anterior temporal and right premotor regions. These results highlight shared processing principles, yet partially distinct mechanisms for the abstraction of phonemes and prosody, which may support their robust and concurrent perception.

**Keywords:** MEG, multivariate analysis, source localization, modeling, speech perception, language, hearing

**Presentation type:** Original Research Talk

## **Left or right and top or down: Multiple Simon effect in two-dimensional stimuli**

Pamela Baess \*, Christina Bermeitinger

*University of Hildesheim*

Spatial compatibility effects such as the Simon effects are rather robust showing that spatially incompatible mappings between stimulus position and response are not ignored. Previous research used stimulus and response sets varying along both the horizontal and vertical dimension simultaneously. Here, conflicting results were found whether or not the horizontal dimension shows a prevalence over the vertical dimension as shown by differences in the size of Simon effects. These studies used stimulus displays that allowed the simultaneous spatial coding along two different reference frames. However, results were only presented in regard to the horizontal or vertical dimension while mostly ignoring the possible two different kinds of Simon effects within each dimension.

Therefore, the current study used a stimulus display including both, spatial locations varying along different reference frames and dimensions. This ensured that two kinds of Simon effects, i.e. a global (based on the absolute screen position) and a local Simon effect (based on the relative position within the screen's hemifield) were investigated in the horizontal and vertical dimension. This setup conceptually replicates the study by Rubichi et al, 2005 (Exp. 4) while using the same participants for both dimensions utilizing only their hands as effectors. In contrast to this study, simultaneous global and local Simon effects were observed for either dimension. Further, the global Simon effects were larger than the local ones in either dimension. These results speak against a prevalence effect in regard to stimulus dimension.

**Keywords:** spatial compatibility, Simon task, horizontal dimension, vertical dimension, reference frames, multiple Simon effects

**Presentation type:** Original Research Talk

## Decoding Cultural Influences on Visual Object Categorization in Infants

Marlena Baldauf <sup>1\*</sup>, Yasuhiro Kanakogi <sup>2</sup>, Hiromichi Hagihara <sup>2</sup>, Rizu Toda <sup>2</sup>, Moritz Köster <sup>1</sup>

<sup>1</sup> *University of Regensburg*, <sup>2</sup>*Osaka University*

Categorization — the ability to classify stimuli into distinct categories — is crucial to structure visual input and organize the visual world (Mareschal & Quinn, 2001; Grossmann et al., 2009; Hoehl, 2016). While infants already show the ability to categorize visual stimuli in their first year after birth (Xie et al., 2022), it remains an open question of how much of their early emerging representations are shaped by experience. Looking time studies suggest that familiarity affects infants' categorization performance already at four months (Kovack-Lesh et al., 2010). Yet, the impact of visual experience on categorization remain to be further explored.

Here, we employ a cross-cultural approach to examine categorization in infants at 5 and 11 months from Germany and Japan. To investigate categorization processes, we decode the categories from Japanese and German items from the EEG. Specifically, infants saw 36 images from five categories, with items reflecting either typical German or Japanese cultural contexts. We applied Representational Similarity Analysis to determine category decoding accuracy and its temporal dynamics.

Preliminary results from 91 infants suggest a clear difference in category decoding accuracy between culturally familiar and unfamiliar items for 11-month-olds, with potential differences emerging as early as 5 months. We will further present data on face processing of culturally familiar and unfamiliar faces to disentangle perceptual narrowing and perceptual learning processes. This study holds the promise to offer exciting insights into how early categorization is bound by culture-specific experiences.

**Keywords:** Cognitive Development, Category Learning, EEG, Representational Similarity Analysis, Infancy

**Presentation type:** Original Research Talk

## **Anchor-level scene semantic effects on spatial coding in naturalistic (virtual) environments**

Bianca Baltaretu <sup>1\*</sup>, Petros Georgiadis <sup>1</sup>, Melissa Vö <sup>2</sup>, Katja Fiehler <sup>1</sup>

<sup>1</sup> *Experimental Psychology Department, Justus Liebig University, Giessen, Germany*, <sup>2</sup>*Department of General Psychology, Goethe University, Frankfurt am Main, Germany*

Interacting with objects in our environment involves object perception and object location coding. This can be achieved by using an egocentric (self-centred) and/or allocentric (object-centred) reference frame. For memory-guided actions, allocentric coding for more naturalistic scenarios has been shown to be subject to the influence of low- to high-level factors (e.g., task relevance). The semantic relationship between local objects (small, moveable) has also been shown to strengthen allocentric coding (i.e., stronger effects for local objects of the same object category). Currently, the role of the next level of the scene grammar hierarchy, i.e., anchor objects (large, stationary, predictive), in allocentric coding is largely unexplored. Here, we investigated the effect of anchor 1) identity and 2) presence on allocentric coding of local objects within two scene types (kitchen, bathroom). In a virtual environment, three local objects were presented on a shelf in one of three conditions: 1) scene-congruent anchors present, 2) cuboids present, or 3) only the shelf present. After a brief mask and delay, the scene was presented again without the local objects and one of the anchors/cuboids shifted (leftward or rightward) or not shifted. Then, participants had to grab the presented local object target with the controller and place it in its remembered location on the empty shelf. Our findings showed that placement behaviour was neither affected by anchor identity changes, nor by anchor presence. These findings suggest that any large(r), stable anchor object that is present benefits allocentric coding of local objects in memory-guided placement tasks.

**Keywords:** Scene semantics; Scene perception; Object perception; Allocentric coding; Memory-guided action; Virtual Reality

**Presentation type:** Original Research Talk



## How does brightness induction work at night?

Pablo A. Barrionuevo <sup>1, 2\*</sup>, Alexander C. Schütz <sup>1</sup>, Karl R. Gegenfurtner <sup>3</sup>

<sup>1</sup> *Allgemeine und Biologische Psychologie, Philipps-Universität Marburg, Marburg, Hessen, 35032, Germany*, <sup>2</sup>*Instituto de Investigación en Luz, Ambiente y Visión, Consejo Nacional de Investigaciones Científicas y Técnicas – Universidad Nacional de Tucumán, San Miguel de Tucumán, Tucumán, T4002BLR, Argentina*, <sup>3</sup>*Allgemeine Psychologie, Justus-Liebig-Universität, Giessen, Hessen, 35394, Germany*

At low light levels, our visual sensation is mediated by phototransduction of rods. These photoreceptors are anatomically and functionally distinct from cone photoreceptors that mediate vision in daylight. However, it is not well understood how rod perception differs from the well-known cone perception. Brightness induction is a complex perceptual phenomenon that can produce two opposing effects (assimilation and contrast) and explanations range from low to high level theories. The aim of this study was to understand how brightness induction is achieved when only rod photoreceptors are active.

We performed three experiments on young observers: 1) The brightness induction strength was obtained for two stimulus configurations: White's illusion (assimilation) and simultaneous brightness contrast, under different light adaptation conditions favoring cones or rods; 2) We used silent substitution on a tetrachromatic display to selectively stimulate rods or cones at a fixed light adaptation level, and measured the brightness induction for assimilation and contrast for isolated rods, isolated cones, and combined rods and cones; and 3) We estimated the perceived transparency of samples with different opacities at different light adaptation levels.

Our results showed that compared to cone vision, rod-mediated brightness induction was stronger for assimilation, but doesn't change for contrast. Furthermore, transparency was underestimated at low light levels. These results suggest that brightness assimilation is mediated by a high-level transparency percept; following the scission theory (Anderson, 1997), the stronger induction is linked to a transparency underestimation at night light levels. In contrast, rod-mediated brightness contrast can be explained by low-level mechanisms.

**Keywords:** Rod vision, brightness perception, low-level mechanisms, inferences, photoreceptors

**Presentation type:** Original Research Talk

## Tonic locus coeruleus upregulation as a mechanism of increased precision weighting in autism

Nico Bast \*

<sup>1</sup> *Department of Child and Adolescent Psychiatry, Psychosomatics and Psychotherapy, Autism Research and Intervention Center of Excellence, University Hospital Frankfurt, Goethe-University, Deutschordenstraße 50, 60528 Frankfurt am Main, Germany*

Background: Sensory processing optimizes predictions on sensory input. This predictive coding usually entails prediction errors prompting further sensory processing. Prediction errors are weighted by precision, which can be an attributed salience of the sensory input. Many autistic individuals report different sensory processing, which has been associated with increased precision weighting. The locus-coeruleus norepinephrine (LC-NE) system modulates the neuronal gain of sensory input. We hypothesized that LC-NE tonic upregulation underlies an increased precision weighting in autism.

Methods: Autistic (n=139) and non-autistic (n=98) individuals were assessed during a passive auditory oddball task with pupillometry and electroencephalography. A baseline pupil size (BPS) assessed LC-NE tonic activity that estimated precision weighting. A stimulus-evoked pupillary response (SEPR) assessed LC-NE phasic activity that estimated sensory-driven selectivity. Electroencephalography assessed amplitudes of mismatch negativity (MMN-amp) that estimated prediction errors. Measures were modeled between groups within the task by combining Frequentist and Bayesian approaches.

Results: Across groups, higher BPS was associated with more negative MMN-amp to standards and oddballs. Controlling for this association, autistic versus non-autistic individuals showed a higher SEPR in response to standards. In addition, an association of BPS and SEPR to standards was specific to autistic individuals. With task progression, autistic versus non-autistic individuals showed a higher initial increase and subsequently higher decrease of BPS. This was supported by Bayesian posteriors.

Conclusions: The findings characterize sensory processing in autistic individuals by increased sensory-driven selectivity to frequent stimuli. This is caused by an LC-NE tonic upregulation during sensory processing that underlies increased precision weighting in autistic individuals.

**Keywords:** pupillometry, autism spectrum condition, mismatch negativity, arousal, sensory processing, auditory oddball paradigm

**Presentation type:** Original Research Talk

## Confidence in auditory perceptual completion

Cemre Baykan <sup>1\*</sup>, Pascal Mamassian <sup>2</sup>, Alexander C. Schütz <sup>1</sup>

<sup>1</sup> *General and Biological Psychology, Department of Psychology Philipps University of Marburg, Germany,* <sup>2</sup>*Laboratoire des Systèmes Perceptifs, Département d'études cognitives, École Normale Supérieure, PSL University, CNRS, Paris, France*

Perceptual completion is a phenomenon in which the brain fills in the gaps in sensory information that are either caused internally because of the lack of receptors, or externally by (self)-occlusion in the environment. Previous studies have shown that observers report higher confidence for perceptually completed than veridical visual stimuli, while being unaware of the missing sensory information. Here, we investigated whether similar metacognitive biases would emerge in auditory completion. We ran two separate experiments using stimuli that were uninterrupted or interrupted tones, both accompanied by noise. In Experiment 1, participants performed a continuity-discontinuity decision and a confidence rating for a single stimulus. In Experiment 2, they performed continuity-discontinuity decisions for two consecutive stimuli and made a forced-choice confidence judgment selecting the decision they felt more confident about. We found that the interrupted sounds with a masking noise were reported frequently as uninterrupted, implying auditory completion. Confidence ratings in the first experiment correlated with response consistency in the continuity-discontinuity decisions. Forced-choice confidence judgments in the second experiment showed that participants were not able to distinguish the filled-in stimulus from a continuous stimulus with a similar masking noise. Most importantly, there was no clear preference for a veridical compared to a perceptually completed stimulus. Our results extend the findings from the visual modality, demonstrating that listeners are unaware of auditory completion and trust filled-in information as much as veridical information in audition.

**Keywords:** auditory continuity illusion, temporal induction, metacognition, auditory confidence

**Presentation type:** Original Research Talk

## **Spatial Context Outweighs Temporal Context in Resolving Bistable Perception**

Lisa Beckmann <sup>\*</sup>, Thomas Schenk , Karin Ludwig

*Ludwig-Maximilians-Universität München*

Binocular rivalry (BR) offers a window into how perception is constructed, shaped by spatial and temporal context cues. Spatial context is often provided in form of a surrounding annulus, and a widely used type of temporal influence is flash suppression in which a stimulus shown prior to the BR-stimulus biases its perception. While these types of contexts have been individually studied, their combined effects have not yet been explored. We investigated spatial-temporal context interactions during rivalry in two experiments. Using orthogonal gratings as rivalry stimuli, we manipulated spatial surround strength through contrast changes and flash suppression strength by varying the blank duration (Experiment 1, N = 17) and probe durations (Experiment 2, N = 17). We measured both the dominant percept as well as its clarity. Using each type of context alone confirmed previous findings. However, combining spatial and temporal factors revealed the following additional insights: when both contexts favored the same grating, the effects were additive. When spatial and temporal context favored different gratings, the influence of the spatial context dominated. Clarity ratings differed across experiments, revealing differences between the two manipulations of the temporal effect. Our results demonstrate that temporal and spatial contextual factors can have a cumulative effect when they align and that spatial context tends to prevail in conflicting situations. This underscores the critical role of spatial context in visual perception.

**Keywords:** bistable perception, flash suppression, center-surround interactions, figure-ground segmentation, spatial context cues, temporal context cues

**Presentation type:** Original Research Talk

## **Ethiktool - Eine Softwarelösung zur Unterstützung der ethischen Begutachtung von Forschungsvorhaben**

Alexandra Bendixen <sup>1\*</sup>, Thomas G.G. Wegner <sup>2</sup>, Katarina Blask <sup>2</sup>, Eva-Maria Berens <sup>1, 3</sup>, Tina Frenzel <sup>1</sup>, Wolfgang Einhäuser <sup>1</sup>

<sup>1</sup> Technische Universität Chemnitz, <sup>2</sup>Leibniz-Institut für Psychologie (ZPID), <sup>3</sup>Universität Bielefeld

Humanwissenschaftliche Forschung muss aus gutem Grund ethischen Richtlinien folgen. Die formalen Abläufe zur Prüfung der ethischen Unbedenklichkeit können jedoch für die Forschenden

und für die Mitglieder von Ethikkommissionen erhebliche Zeitinvestitionen mit sich bringen. Um hier Entlastung zu schaffen, wurde an der Technischen Universität Chemnitz die Software „Ethiktool“ entwickelt und befindet sich dort seit Mitte 2021 erfolgreich im Einsatz. Das Ethiktool unterstützt die Erstellung von Ethikanträgen über eine dialogbasierte Abfrage aller relevanten Aspekte für die Ethikbegutachtung. Die gestellten Fragen passen sich dynamisch an die bisherigen Eingaben an. Das Ethiktool prüft die Eingaben auf formale und inhaltliche Konsistenz und erzeugt schließlich den eigentlichen Ethikantrag sowie die Teilnahmedokumente (Aufklärung, Datenschutzinformation usw.), indem es vorformulierte mit frei einzufügenden Textabschnitten kombiniert. Die softwaregeleitete Abfrage und automatische Dokumentenerzeugung erlaubt es den Antragstellenden wie auch den Ethikkommissionsmitgliedern, sich auf die ethischen Kernpunkte des Forschungsvorhabens zu konzentrieren. In unserer Präsentation und am dazugehörigen Stand werden wir den Entwicklungsstand der neuen, browserbasierten Version des Ethiktools demonstrieren, die eine ortsunabhängige Nutzung und flexible Anpassung an die lokalen Abläufe anderer Standorte ermöglicht. Mit dem erfolgreichen Abschluss unserer Software-Entwicklung werden wir das Ethiktool allen interessierten Ethikkommissionen kostenfrei über das Leibniz-Institut für Psychologie (ZPID) zur Verfügung stellen. Im Ausblick der Präsentation werden wir diskutieren, inwieweit das Ethiktool die inhaltliche Qualität der Anträge sowie die Konsistenz ethischer Begutachtungsprinzipien über Standorte hinweg befördern kann und wie die damit verbundene Erleichterung Kapazitäten für die Wissenschaft freisetzen kann.

**Keywords:** Ethikantrag, Ethikvotum, Begutachtung, Ethikkommission, Softwareentwicklung, Forschungsinfrastruktur

**Presentation type:** Original Research Talk

## **The effect of context and individual differences in human-generated randomness**

Mikołaj Biesaga \*, Szymon Talaga , Andrzej Nowak  
*The Robert Zajonc Institute for Social Studies*

Many psychological studies have shown that human-generated sequences are hardly ever random. However, what remains an open question is the degree to which this (in)ability varies between people and is affected by contextual factors. We used a modern, robust measure of randomness based on algorithmic information theory to assess human-generated series. In S1, we tested the effects of context and mental fatigue on human-generated randomness. In S2, we investigated the effect of mental fatigue on the randomness and the relationship between the need for cognition

(NFC) and the ability to produce random-like series. Results of S1 show that the activation of the ability to produce random-like series depends on the relevance of the contextual cues, whether they activate known representations of a random series generator and consequently help to avoid the production of trivial sequences. Our findings from S1 and S2 on the effect of mental fatigue and cognitive motivation demonstrate that regardless of the context or task's novelty people quickly lose interest in the random series generation. However, people high in the NFC can maintain cognitive motivation for a longer period and consequently on average generate more random series.

**Keywords:** Algorithmic complexity; Cognitive motivation; Individual differences; Random numbers generation; Random series production; Working memory capacity

**Presentation type:** Original Research Talk

## Unlocking Parallel Task Processing: The Role of Predictability and Context Stability

Jovita Brüning <sup>1\*</sup>, Inga Lück <sup>2</sup>, Markus Ullsperger <sup>1</sup>, Rico Fischer <sup>2</sup>

<sup>1</sup> *Otto-von-Guericke Universität Magdeburg*, <sup>2</sup> *Universität Greifswald*

Extensive research has examined the ability to process multiple tasks in parallel, with recent studies highlighting systematic individual preferences for serial versus parallel processing modes. To determine whether these modes reflect traits or states, we investigated their dependence on task environment predictability and volatility using the task switching with preview paradigm (TSWP). In classical TSWP, participants alternate predictably between two displayed tasks, with the preview of the currently irrelevant task allowing response preparation. Key findings revealed that some individuals processed the preview in parallel (overlapping processing) to achieve switch benefits, whereas others opted for serial processing. We investigated whether these processing modes reflect traits or states by manipulating task predictability. In Experiment 1 (N = 60), we introduced blocks with variable task sequences, in which tasks alternated randomly every second to fourth trial. Results showed a marked shift toward more serial processing in variable relative to fixed sequence blocks, suggesting reduced use of the preview under unpredictable conditions. To determine whether predictability or context volatility caused these results, Experiment 2 (N = 60) added a countdown to the variable sequence blocks, making task switches predictable while maintaining context volatility. Unlike Experiment 1, the data revealed only a slight reduction in the use of the preview across varying sequence lengths, indicating that parallel processing is influenced by task predictability rather than context volatility. These findings suggest that individual differences in

processing modes are modulated by state-like factors such as task predictability. Implications for understanding flexibility in individual multitasking preferences are discussed.

**Keywords:** Task Switching, Parallel Task Processing, Individual Differences

**Presentation type:** Original Research Talk

## **Understanding sharing behavior on social media platforms: How the ability to discern between manipulative and non-manipulative content influences sharing manipulative and false information**

Laura Burkhardt <sup>1\*</sup>, Nicole Antes <sup>2</sup>, Nadia Said <sup>1</sup>

<sup>1</sup> *Department of Psychology, University of Tübingen; Schleichstr. 4, 72076 Tübingen, Germany,*

<sup>2</sup>*Leibniz-Institut für Wissensmedien; Schleichstraße 6, 72076 Tübingen, Germany*

Social media has shaped our world in the last decades. The initial enthusiasm, however, transformed into concerns about the dangers of unchecked sharing of false information. This has prompted a large body of research about the spread and impact of false information. Recent research showed that misleading information (implied misinformation) rather than false information is of much more concern. To gain a deeper understanding of what predicts sharing of misleading information we adapted the Manipulative Online Content Recognition Inventory (MOCRI) for Germany. Participants ( $N = 447$ ) read 28 statements (5 true, 5 false, 9 manipulative, 9 non-manipulative) that they could share on our platform *ChirPing*. *ChirPing* is a realistic social media platform which allows us to assess sharing behavior. Our study thus goes beyond previous research as we assess behavior instead of intention. In contrast to Maertens et al. (2023) there was no relationship between discernment ability and sharing of misleading information. However, sharing of content was not evenly distributed: 57% of participants ( $N = 253$ ) did not share any post. When only taking participants into account who did share one or more posts (exploratory), results showed that participants who scored high on MOCRI shared less manipulative content. Furthermore, MOCRI also significantly predicted the sharing of false information. Taken together our results emphasize the importance to not rely on sharing intention only. Furthermore, our results show that, if people do share content, MOCRI is not only predictive of sharing manipulative but also false information.

**Keywords:** manipulation, discernment, online content, sharing behavior, misinformation

**Presentation type:** Original Research Talk

## **Improving Doctor-Patient Communication Using Large Language Models - Results from an Experimental Online Study**

Christian Böffel <sup>1\*</sup>, Stella J. Soyka <sup>2</sup>, Sibumundi <sup>2</sup>, Wolfgang Wick <sup>2</sup>, Sabine J. Schlittmeier <sup>1</sup>, Varun Venkataramani <sup>2</sup>

<sup>1</sup> *RWTH Aachen University, Institute of Psychology, Work and Engineering Psychology*, <sup>2</sup> *University Hospital Heidelberg, Neurology Clinic and National Center for Tumor Diseases*

This experiment investigates the potential of large language models (LLMs) to improve patient-doctor communication by translating complex medical jargon into comprehensible lay terms, thereby enhancing patients' understanding and involvement in their healthcare with the goal of enabling informed healthcare decisions. First, a set of four medical notes was created by neurologists representing typical cases in the neurology clinic. GPT4 was then used to translate these notes into layman's terms, and an experimental online study was conducted to examine how laypeople understand and subjectively evaluate the original and translated texts. Each participant was presented with two translated and two original medical notes. The order and whether the note was translated or not was counterbalanced between participants. After each note, the participant's comprehension was assessed through content-related questions. Participants were also asked to indicate how they subjectively perceived each text in terms of difficulty, uncertainty, empathy, and mental effort. Analyses comparing original and translated notes revealed significant benefits of translation in all aspects measured. The discussion addresses methodological considerations, limitations of translation accuracy, challenges related to prompting, and considerations for integrating this approach into clinical practice.

**Keywords:** Experimental Online Study; Large Language Models; Human-AI-Interaction; Human Factors; Engineering Psychology

**Presentation type:** Original Research Talk



## Decoding residual visual processing during blindsight

Yuranny Cabral-Calderin <sup>1\*</sup>, Lucia Melloni <sup>1, 2, 3</sup>

<sup>1</sup> *Neural Circuits, Consciousness and Cognition Research Group, Max Planck Institute for Empirical Aesthetics, 60322, Frankfurt am Main, Germany.*, <sup>2</sup>*Department of Neurology, NYU Grossman School of Medicine, New York, New York, USA.*, <sup>3</sup>*Predictive Brain Department, Research Center One Health Ruhr, University Alliance Ruhr, Ruhr-Universität Bochum, Bochum, Germany.*

It is well established that damage to the primary visual cortex does not entirely eliminate the brain's capacity for visual processing. Some patients with lesions in the visual cortex exhibit above-chance visual performance in processing stimuli within their blind field, even when reporting no conscious awareness of the stimulus—a phenomenon known as Blindsight. In this study, we investigated four patients with lesions affecting visual cortical areas of varying etiologies and extents. Patients performed a spatial attention task where they had to indicate the presence and orientation of a grating with different spatial frequencies presented either on the intact or on the blind visual field. Simultaneously, intracranial EEG and peripheral physiological signals were recorded. Two patients exhibited classic blindsight symptoms, demonstrating above-chance performance in judging the orientation of a visual target when presented to the blind hemifield, especially for lower spatial frequencies. Notably, these patients had lesions in the right hemisphere, including primary visual cortex, whereas the other two patients, who showed no signs of blindsight, had lesions in the left hemisphere. This finding suggests a potential role for right hemisphere lesions, but not left hemisphere lesions, in the manifestation of blindsight symptoms. Follow-up analysis focuses on determining whether detection of visual stimuli can be decoded from physiological and brain signals originating from intact brain regions.

**Keywords:** Consciousness, blindsight, visual processing

**Presentation type:** Original Research Talk

## Causal Inference in Visuotactile Temporal Judgements

Bora Celebi <sup>\*</sup>, Müge Cavdan , Knut Drewing

*Justus-Liebig University, Gießen, HapLab*

We integrate or segregate signals received from different senses according to their spatial and temporal relations. When signals are close in time and location, they are more likely to be integrated. The Bayesian causal inference framework provides a robust theoretical model for understanding these processes. It posits that the brain integrates sensory signals when they are perceived as arising from a common cause while segregating them otherwise. Thus far, the model

has been predominantly applied to localization judgments. Here, we studied it in the context of temporal judgments. In two experiments, we investigated (1) the role of spatial congruency on visuotactile simultaneity judgments, and (2) how tactile signals influence visual duration judgments when they are temporally synchronous or not. Participants were immersed in a VR environment where tactile stimuli were delivered to their real hands. The corresponding visual stimuli were presented on a virtual representation of their hands, enabled through hand tracking. The temporal binding window widened with spatial congruency, possibly due to an enhanced integration process. Further, perceived visual durations were shifted towards the tactile interval when the two signals were temporally synchronized. The Bayesian causal inference framework successfully modeled the effects of spatial congruence and temporal proximity on these multisensory temporal judgments.

**Keywords:** multisensory integration, time perception, visuotactile, causal inference

**Presentation type:** Original Research Talk

## **A Joy Bias: Emotion Perception from Full-Body Movements Is Modulated by Enculturation**

Julia F. Christensen <sup>1\*</sup>, Klaus Frieler <sup>1</sup>, Meghedi Vartanian <sup>2, 3</sup>, Shahrzad Khorsandi <sup>4</sup>, Fahima Farahi<sup>5</sup>, Sina H.N. Yazdi <sup>5</sup>, Susana Bravo Serra <sup>6</sup>, Vincent Walsh <sup>7</sup>

<sup>1</sup> *Department of Cognitive Neuropsychology, Max Planck Institute for Empirical Aesthetics, Frankfurt/M, Germany*, <sup>2</sup>*Department of Neurology, Max Planck Institute for Human Cognitive and Brain Sciences, Leipzig, Germany*, <sup>3</sup>*Day Clinic for Cognitive Neurology, University of Leipzig Medical Center, Leipzig, Germany*, <sup>4</sup>*Shahrzad Dance Company, Richmond, San Francisco, USA*, <sup>5</sup>*WiseWold.AI, Porto, Portugal*, <sup>6</sup>*Missis Bravo Films, Palma, Spain*, <sup>7</sup>*Institute for Cognitive Neuroscience, University College London, UK*

While emotional expression via the body is universal across cultures, labelling emotions into 'emotion-word' categories is not universal, but learned – especially within the Western realm. The Theory of Constructed Emotions (TCE), proposes that emotion perception is a dynamic process; dependent on education and enculturation. Based on previous work using Western expressive gestures, we designed a video-stimuli library with gestures from a non-WEIRD cultural tradition [Henrich, et al., (2010). The weirdest people in the world? *Behaviour and Brain Sciences*, 33(2-3)], which our participants had different levels of enculturation with. Stimuli consisted of 6-second-long sequences of Iranian social dance gestures, danced 5x each with different emotional expressivities. Thus, the same movement trajectories were used to express five 'basic' emotions (anger, fear, joy, sadness, neutrality). Across five, one pre-registered, experiments with 400+ culturally Iranian,

English and Southeast Asian participants, we tested how enculturation modulated emotion perception from full-body movement. We specifically did not merely ask our participants to indicate their self-ascribed ‘cultural group’, but applied enculturation screening questionnaires which returned continuous measures of enculturation with Iranian and English culture. Data was collected in 2020 (experiments 1-4), and in 2023 (experiment 5). Mixed-model logistic regressions showed that, categorical emotion labelling was modulated by English enculturation. Enculturation with Iranian culture produced a ‘joy bias’; a tendency to attribute joyful expressivity to the movements, in accordance with the joyful festive context in which these expressive social dance gestures usually occur. These results evidence an effect of enculturation on emotion perception, in line with the TCE.

**Keywords:** Theory of Constructed Emotion; Basic Emotions; Enculturation and Acculturation; Cross-cultural; Full-Body Movement; Non-Verbal Communication; Expressivity; Iran; Europe; Persia; Dance; Iranian dance; Emotion Recognition; Emotion labelling

**Presentation type:** Original Research Talk

## Single-neuron representations of “What” and “Where” in the human medial temporal lobe

Qian Chu <sup>1, 2, 3, 4\*</sup>, Thomas Biba <sup>2, 3</sup>, Ivan Skelin <sup>2</sup>, André Cornejo Marin <sup>2, 3</sup>, Suneil Kalia <sup>1, 2, 3</sup>, Taufik Valiante <sup>1, 2, 3</sup>, Lucia Melloni <sup>1, 4, 5, 6</sup>

<sup>1</sup> Max Planck - University of Toronto Centre for Neural Science and Technology,

<sup>2</sup> Krembil Brain Institute & KITE Research Institute & CRANIA, University Health Network,

<sup>3</sup> University of Toronto, <sup>4</sup> Max Planck Institute for Empirical Aesthetics, <sup>5</sup> New York University Grossman School of Medicine, <sup>6</sup> Research Center One Health, Ruhr University Bochum

In the “Where’s Wally” game, we search a chaotic scene through eye movements to identify Wally. However, upon revisiting the same scene, we can quickly recall Wally’s location and direct our gaze accordingly. This example illustrates how visuospatial perception and memory are dynamically shaped by eye movements. Yet, it remains unclear whether the identity of an object (“what”) and its spatial location (“where”) are stored in memory as a conjunctive code or as separate representations.

To address this question, we leveraged the rare opportunity to record single-unit activity from patients with epilepsy to investigate the neural codes of identity and space in the human medial temporal lobe (MTL). During each mini-block, patients encoded a four-item visuospatial memory by fixating on four oblique locations, each presenting a different image in a gaze-contingent manner.

They then re-explored the layout in the same gaze-contingent manner and were tasked with judging visuospatial match/mismatch, constituting the retrieval phase. We identified two distinct populations of cells: identity-selective units and location-selective units. These populations formed an orthogonal neural code for identity and space in the human MTL. Identity selectivity was most prominent in the amygdala and hippocampus, whereas location selectivity was confined to the parahippocampal cortex. Furthermore, the firing of both identity- and location-selective cells were expedited during retrieval, providing support for predictive processing models of MTL function.

These findings provide evidence for segregated neural coding of identity and space in the human MTL, offering new insights into how active vision supports visuospatial memory.

**Keywords:** eye movements, episodic memory, spatial memory, medial temporal lobe, hippocampus, working memory, active vision

**Presentation type:** Original Research Talk

## **Individual strength of autobiographical memories enhances object retention in visual working memory**

Markus Conci \*

*Department of Psychology, Ludwig-Maximilians-Universität München*

Visual working memory (VWM) is limited in capacity, but this limitation may be ameliorated by providing familiar objects that are associated with knowledge stored in long-term memory. For instance, complex but meaningful items can be remembered better than perceptually identical, yet meaningless stimuli (Conci et al., 2021), while active learning of the meaning of previously meaningless objects improves VWM capacity beyond basic stimulus repetition effects (Conci et al., 2023). The current study tested whether the individual strength of memory traces modulates the effect of meaning upon VWM capacity. To this end, a change detection task was performed that required observers to remember pictures of more or less familiar faces. The results revealed that performance improved for unfamiliar, upright faces relative to unfamiliar, yet inverted faces, indicating that holistic face processing influences memory retention (Curby & Gauthier, 2007). Moreover, unfamiliar, upright faces were lower in capacity than pictures of well-known celebrities, thus replicating a benefit of familiarity upon VWM performance (Jackson & Raymond, 2008). Finally, capacity was highest for faces that depicted close friends and family members of the individual participants. This shows that autobiographical memories reveal particularly strong cues for VWM retrieval. Together, these findings thus show that the strength of individual long-term-memories

scales with the ability to retain an object in working memory, while this benefit of familiarity upon the short-term retention of visual information is largely independent of perceptual variations in the to-be-remembered stimuli. This demonstrates that VWM performance is boosted by specific knowledge derived from long-term memory.

**Keywords:** visual working memory, change detection, long-term memory, familiarity, object knowledge, autobiographical memory

**Presentation type:** Original Research Talk

## Exploration in Domains with Gains or Losses

Ludwig Danwitz \*, Ann-Katrin Hosch , Bettina von Helversen

*Universität Bremen*

To minimize losses or maximize gains, individuals must understand the rules and patterns in their environment. This study examines how environmental factors influence exploration and exploitation behaviors, comparing environments where participants can either only win (with varying gain sizes) or only lose (with varying loss sizes). Participants completed a Multi-Armed Bandit task across these conditions in two online experiments. Results showed reduced exploration behavior but better performance in gain environments compared to loss environments.

The relative richness of the environment—whether an environment yields more or fewer points than expected based on prior blocks—also influenced exploration. Richer-than-expected environments reduced exploration, particularly in the gain domains, where this reduction harmed performance as participants overlooked lucrative opportunities.

Computational modeling revealed three processes underlying exploration behavior: optimism under uncertainty, which biases participants toward uncertain options; random exploration, where participants occasionally choose suboptimal options to gather information; and unsystematic noise, reflecting erratic choice behavior.

Increased exploration in poorer environments stemmed from noisier behavior, while decreased exploration in richer environments was driven by relatively reduced optimism under uncertainty.

These findings highlight the nuanced interplay between environmental context and cognitive mechanisms in shaping exploration and exploitation behaviors.

**Keywords:** Exploration-Exploitation, Loss aversion, Noise, Reinforcement Learning, Uncertainty, Decisions from experience

**Presentation type:** Original Research Talk

## Does training inhibitory control improve extinction learning?

Kaneez Fatima Dar <sup>1\*</sup>, Manish Kumar Asthana <sup>1, 2</sup>

<sup>1</sup> *Department of Humanities and Social Sciences, Indian Institute of Technology Roorkee , India,*

<sup>2</sup> *Department of Design, Indian Institute of Technology Roorkee, India*

Inhibitory learning forms an essential component of extinction. Deficits in inhibitory learning could negatively impact extinction learning (Craske et al., 2008). The current study aims to improve inhibitory learning capacity through training inhibitory control to improve extinction. Fifty-one participants completed a 3-day fear conditioning paradigm (Day1: Acquisition; Day2: Extinction; Day 3: Extinction recall). Participants were divided in two groups inhibitory control training and extinction (IC-SE) and standard extinction group (SE), participants performed stop-signal task before extinction in IC-SE group. An independent sample t-test on CS+ expectancy rating during extinction  $t(49) = -2.211$ ,  $p = .032$ ,  $d = -.620$ , and re-extinction  $t(49) = -2.567$ ,  $p = .011$ ,  $d = -.746$  revealed a significant group difference between IC-SE and SE group, with lower CS+ expectancy ratings in IC-SE than SE group. Further, we also found a significant group difference in subjective arousal of CS+ during extinction  $t(49) = -2.760$ ,  $p = .008$ ,  $d = -.774$  and re-extinction  $t(49) = -2.548$ ,  $p = .014$ ,  $d = -.715$ , with lower CS+ arousal ratings in IC-SE than SE group. Our findings imply training inhibitory control assists in forming inhibitory associations during extinction, resulting in reduced UCS-expectancy in IC-SE group. Further, we observed elevated physiological arousal in IC-SE group during extinction. Previous research has shown better consolidation of memory under high arousal state, this explains the better recall of extinction learning during extinction recall phase. Improving inhibitory control enhances extinction, this finding can aid development of interventions for individuals with anxiety disorders, who show deficits in inhibitory learning.

**Keywords:** Fear extinction, inhibitory control, inhibitory learning

**Presentation type:** Original Research Talk

## The role of working memory in task-order coordination: Insights from dual-task training

Daniel Darnstaedt \*, Joelin-Sofie Standtke , Torsten Schubert

*Martin-Luther University Halle-Wittenberg*

Effective task-order coordination (TOC) is crucial for managing bottleneck processing in dual-task (DT) situations. Prior research has identified increased TOC costs – reflected in reaction time

differences – when comparing variable to fixed task orders of component tasks. Our previous work demonstrated that practicing two temporally overlapping tasks with variable task order can reduce these costs. In the present study, we investigate the mechanisms underlying this improvement, focusing on the role of working memory (WM) in TOC acquisition and application.

Participants practiced two visual-manual tasks presented in variable order under one of three conditions: (1) training with a concurrent high WM load, (2) training without additional task, or (3) training without additional task but testing under high WM load. TOC performance was assessed via Task-Order Scheduling (TOS) costs, comparing reaction times in random-order versus fixed-order blocks during pre- and post-training sessions.

In the post-training session without WM load, participants who trained without concurrent load exhibited reduced TOS costs, replicating earlier findings. However, participants who trained with additional WM load showed no such improvement in TOS. Furthermore, in the post-training test with additional WM load, none of the groups demonstrated reduced TOS costs, regardless of prior training success.

These findings highlight the critical role of WM resources in both acquiring and applying optimized TOC strategies. Specifically, WM appears necessary for effective learning of TOC during training and for the application of these skills under cognitive load.

**Keywords:** cognitive training, task-order coordination, dual-task training, working memory

**Presentation type:** Original Research Talk

## Scene viewing from kindergarten to retirement - learning canonical gaze

Ben de Haas \*, Marcel Linka

*Experimental Psychology, Justus-Liebig Universität Gießen*

Two adults viewing the same scene tend to fixate overlapping parts of it. This has led to decades of modeling average fixation densities. However, individual fixation patterns deviate from this in highly reliable ways. How do we get to this point? Do young children fixate scenes in stereotypical ways and acquire individual preferences over time? Or is children's gaze idiosyncratic before becoming more canonical? We present eye-tracking data from >6,500 subjects from 5-72 years of age, freely viewing 40 complex scenes. This large dataset allowed us to trace the development of individual differences by estimating pairwise correlations of fixation patterns, separately for age groups of two years. We find that preschool children tend to fixate fewer elements of a scene and agree on those to almost the same degree as adults do. Then, image exploration and the number of fixated elements increase for more than a decade. In parallel to this, pairwise similarities rapidly drop, the



gaze of children becomes increasingly idiosyncratic until age 14. Then, the trend reverses, patterns of gaze become more and more similar despite a continued increase in exploration. Pairwise similarity only plateaus from the early twenties, showing that the degree to which adult gaze is canonical takes decades to develop. I will speculate on the reasons for this protracted development and its potential relationship to scene understanding.

**Keywords:** scene viewing, gaze, individual differences, development

**Presentation type:** Original Research Talk

## **Variable action-effect couplings reveal dynamic adjustment of top-down predictions**

Fabian Aurich <sup>1</sup>, Tjerk Dercksen <sup>1, 2\*</sup>, Andreas Widmann <sup>3</sup>, Betina Korka <sup>1, 4</sup>, Anni Richter <sup>1, 5, 6</sup>, Max-Philipp Stenner <sup>1, 2, 6, 7</sup>, Nicole Wetzel <sup>1, 2, 8</sup>

<sup>1</sup> *Leibniz Institute for Neurobiology Magdeburg, Germany*, <sup>2</sup> *Center for Behavioral Brain Sciences Magdeburg, Germany*, <sup>3</sup> *Wilhelm Wundt Institute for Psychology, Leipzig University, Leipzig, Germany*, <sup>4</sup> *Zander Labs, München, Germany*, <sup>5</sup> *German Center for Mental Health (DZPG), partner site Halle-Jena-Magdeburg, Magdeburg, Germany*, <sup>6</sup> *Center for Intervention and Research on adaptive and maladaptive brain Circuits underlying mental health, Jena-Magdeburg-Halle, Germany*, <sup>7</sup> *Department of Neurology, Otto-von-Guericke University Magdeburg, Germany*, <sup>8</sup> *University of Applied Sciences Magdeburg-Stendal, Stendal, Germany*

In the brain, actions are assumed to be paired with predictions of the sensory input that they produce. For example, when actions are paired with specific sounds, deviations from these predictions elicit an additional neural response that presumably reflects prediction error. However, in experimental designs applied to date predictions remain relatively fixed, leaving it unclear whether the brain can flexibly adjust predictions on a case-by-case basis. Furthermore, these designs often fail to account for neural adaptation effects, casting doubt whether additional neural activity can be interpreted as prediction error.

This study addressed these issues using a paradigm where participants performed random sequences of left and right button presses. In the 80/20 condition, one hand was coupled to a high likelihood of producing a sound (80%) and the other hand to a low likelihood (20%). In the 50/50 condition, both hands had a 50% likelihood of producing a sound. This design ensured identical adaptation effects across conditions while manipulating trial-by-trial predictions coupled to the button press.



ERP results confirm different predictions between button presses in two main ways. First, unexpected sounds (a sound when the 20%-sound button was pressed) resulted in a mismatch negativity and a P3 response, similar to sounds in the 50/50-condition. Second, unexpected omissions (an omission when the 80%-sound button was pressed) elicited an omission response when compared to expected omissions (an omission when the 20%-sound button was pressed). These findings convincingly demonstrate the brain's ability to flexibly adjust top-down predictions in anticipation of the upcoming action.

**Keywords:** EEG, prediction, omission, MMN, P3, top-down, action

**Presentation type:** Original Research Talk

## **Situational Triggers of Road Rage: Enhancing the Operationalization of Aggressive Driving**

Monique Dittrich \*

*CARIAD SE - Volkswagen Group*

Since the COVID-19 pandemic, the number of traffic offenses and accidents related to aggression has increased, bringing back attention to the persistent problem of road rage for both industry and academia. Driven by practical use cases, a goal is the quantification of aggressive driving, as seen in telematics-based insurance premiums, the simulation of aggression in accident research, or the legal monitoring of aggressive driving behavior.

In this talk, a psychology-driven approach is introduced for modeling the pathway leading to aggressive driving. It is assumed that drivers are confronted with sources of frustration within the driving situation, which elicit negative emotions and culminate in an aggressive action when the individual's emotional threshold is exceeded. Thus, frustrating sources act as contributors to aggression, based on which the prediction and classification of an aggressive action can be optimized. For instance, a short following distance is more likely to be classified as aggressive when preceded by a series of frustrating situations, such as red traffic lights or another vehicle overtaking on the right.

To investigate which emotional sources exist, when, where, and how frequently they occur, and which emotional value they hold, a real-world driving study was conducted, involving 34 participants, who tracked sources that triggered emotions in them. This talk presents the key sources of frustration identified in the study, and makes an initial attempt to reconstruct them using telematics data.

**Keywords:** Road Rage, Aggressive Driving, Emotions, Operationalization, Frustration

**Presentation type:** Original Research Talk

## **Associative learning and coordination dynamics in the brain: Experiments with fMRI data**

Vaibhav Diwadkar \*

*Wayne State University School of Medicine, Detroit Michigan USA 48201*

fMRI signals permit inferences about behaviorally-induced brain network function (Diwadkar & Eickhoff, 2021) and computational approaches to fMRI data can augment psychology's goal of understanding human brain - behavior relationships (Mišić & Sporns, 2016). Here, we examined how associative learning (Büchel et al., 1999) induces *coordination dynamics* (CD, Bressler & Kelso, 2016), i.e. fluctuations in cooperative relations, between brain regions. fMRI data were contemporaneously acquired while participants (n=78) performed a negatively accelerated learning task (Martin et al., 2024). From fMRI time series (90 anatomically defined regions, Tzourio-Mazoyer et al., 2002), we estimated undirected functional connectivity (uFC, Pearson's  $r$ ) in 37 successive partially overlapping time windows [ $C_{(90,2)} = 4005$  unique cooperative interactions between region pairs  $(i,j)$  per window]. Next, for each  $uFC_{(i,j)}$  in each participant's data, a time series was formed from the 37 successive  $r$  values; each represents the CD for that region pair (henceforth,  $CD_{(i,j)}$ ). Similarities between 312,390  $CD_{(i,j)}$  ( $4005 \times 78$ ) were estimated using dynamic time warping (Berndt & Clifford, 1994), before partitioning the set using k-medoids clustering (Kaufman & Rousseeuw, 1994). From our results, clusters representing high CD across the task included brain regions in the anterior and posterior heteromodal cortex (including dorsolateral prefrontal and parietal cortex), the medial temporal lobe and the thalamus. We further show that in a clinical model of dys-connection and altered CD (schizophrenia)(Bressler, 2003), CD were substantially altered. Our results reaffirm the role of coordination dynamics as a central brain mechanism for implementing dynamic behavior.

**Keywords:** Associative Learning, Coordination Dynamics, Functional Connectivity, fMRI

**Presentation type:** Original Research Talk

## Searching for lab-based evidence that mental effort can be inherently rewarding

Chris Donkin <sup>1\*</sup>, Jake Embrey <sup>2</sup>, Luke Gelagin <sup>1</sup>

<sup>1</sup> LMU Munich, <sup>2</sup>University of Chicago, Booth School of Business

Anecdotally, it is obvious that the mental effort required to perform certain activities is itself enjoyable and rewarding. For example, the very act of doing a puzzle or speculating over the guilt of characters in a crime story can feel good. However, finding evidence for this phenomenon in lab-based studies has been surprisingly difficult. We will show that in a series of studies we see that a) it is hard to know what kinds of mental effort that people will exert, b) participants in online studies are focused on minimizing mental effort, and c) even if you can get people to exert unnecessary mental effort, there are countless extrinsic reasons for them to have done so (e.g., because they might be doing the task for a reward, to satisfy a researcher, or because they are good at the task). We will also report results from studies where we see people put in excessive mental effort, but where rewards, demand characteristics, or performance cannot be the reason, suggesting that there may be a way to study the more interesting question of why mental effort can be inherently rewarding.

**Keywords:** mental effort, motivation, insight

**Presentation type:** Original Research Talk

## The Role of Working Memory on Intelligence and Creativity

Zhino Ebrahimi <sup>1\*</sup>, Ann-Kathrin Beck <sup>1</sup>, Kirstin Bergström <sup>1</sup>, Thomas Lachmann <sup>1, 2, 3</sup>, Daniela Czernochowski <sup>1</sup>, Saskia Jaarsveld <sup>1</sup>

<sup>1</sup> Center for Cognitive Science, University of Kaiserslautern-Landau (RPTU), Kaiserslautern, Germany, <sup>2</sup>Centro de Investigación Nebrija en Cognición (CINC), Universidad Nebrija, Madrid, Spain, <sup>3</sup>Brain and Cognition Research Unit, Faculty of Psychology and Educational Sciences, KU Leuven, Leuven, Belgium

This study examines the complex relationships between intelligence, creativity, and working memory providing a detailed understanding of their intricate relationships. A sample of 88 young adults completed a series of cognitive assessments, including the Corsi Block-Tapping Test (CBTT) for visuospatial working memory, Raven's Advanced Progressive Matrices (APM) for fluid intelligence, and both the Creative Reasoning Test (CRT), and the Test for Creative Thinking-Drawing Production (TCT-DP) for visual creativity ending in a well- or ill-problem space,

respectively. The proposed model hypothesized that working memory predicts fluid intelligence and creativity in a well and ill-defined problem spaces. Employing multiple regression analysis, the results revealed that working memory influences fluid intelligence and creativity ending in a well-defined problem space. In contrast, no effect was observed for creative cognition in ill-defined settings, suggesting that alternative processes, such as associative thinking or cognitive flexibility, mainly underlie creative performance. Overall, our findings highlight the role of working memory, deepening our understanding of cognitive interactions between fluid intelligence and creativity.

**Keywords:** Intelligence, Creativity, Working Memory, Problem Space, Creative Reasoning

**Presentation type:** Original Research Talk

## Motivational Moderation of Stimulus-Response Binding

Andreas Eder <sup>1\*</sup>, Anand Krishna <sup>1</sup>, Klaus Rothermund <sup>2</sup>, Carina Giesen <sup>3</sup>

<sup>1</sup> University of Würzburg (JMU), <sup>2</sup>University of Jena, <sup>3</sup>HMU Health and Medical University Erfurt

Hypothesizing a moderating influence of motivation on the formation of action episodes, we investigated whether appetitive and aversive stimuli are more effectively bound to actions when congruent with chronic approach-avoidance goals. To test this hypothesis, we employed a sequential distractor-to-distractor repetition paradigm. In the prime trial, participants (total  $N = 313$ ) pressed one of two response keys to zoom positive or negative images either toward or away; in the probe trial, the same keypresses displaced the affective image to the left or right. Results indicated significant stimulus-response binding and retrieval (SRBR) effects in reaction times during the probe trial when the action in the prime trial was motivationally congruent (positive-approach, negative-avoidance). However, no SRBR effects were observed when the action was motivationally incongruent (positive-avoidance, negative-approach). These findings indicate that distractor-action binding is critically influenced by motivational factors, such as the desirability of the action's outcome.

**Keywords:** stimulus-response binding; action control; episodic memory; approach-avoidance motivation;

**Presentation type:** Original Research Talk

## Perceptual and semantic maps in individual humans share structural features that predict creative abilities

Jonas Elpelt <sup>2\*</sup>, Johannes P.-H. Seiler <sup>1</sup>, Aida Ghobadi <sup>1</sup>, Matthias Kaschube <sup>2</sup>, Simon Rumpel <sup>1</sup>

<sup>1</sup> *Institute of Physiology, Focus Program Translational Neurosciences, University Medical Center of the Johannes Gutenberg University Mainz, Hanns-Dieter-Hüsich-Weg 19, 55131 Mainz, Germany,*

<sup>2</sup> *Frankfurt Institute for Advanced Studies and Institute for Computer Science, Goethe University Frankfurt, Ruth-Moufang-Straße 1, 60438 Frankfurt, Germany*

Building perceptual and associative links between internal representations is a fundamental neural process that allows individuals to organize knowledge about the world and integrate it to support creative and efficient behavior. Representational similarity between pairs of entities reflects their associative connections across sensory processing levels, from lower-order perceptual to higher-order semantic domains. While specific structural features of semantic representational maps have recently been linked to individual creative abilities, it remains unclear to what extent these features are shared with lower-level representational maps that encode perceptual similarities. Here, we investigate this question by presenting human subjects with psychophysical scaling tasks involving two distinct sets of independent and qualitatively diverse stimuli, probing both the auditory perceptual domain and the higher-order semantic domain. Using these tasks, we construct estimates of the corresponding representational structures. Quantitative analysis with graph-theoretical measures reveals a robust positive correlation between specific structural features in the auditory and semantic modalities. Furthermore, we demonstrate that these shared representational features predict multiple standard verbal measures of creativity, suggesting that patterns in both semantic and auditory perception reflect creative capacities. Our findings highlight that the overarching representational geometry of an individual, spanning multiple modalities, may play a central role in creative thought. This insight opens the door to exploring non-verbal perceptual approaches as simplified experimental frameworks for assessing creativity-related abilities in humans. The finding potentially could even be transferred to non-human model organisms, offering a novel pathway for cross-species comparisons of creative cognition.

**Keywords:** representational maps, cognitive maps, creativity, associations, auditory, semantics, networks

**Presentation type:** Original Research Talk

## Do shared internal models drive shared scene perception and exploration across participants?

Micha Engeser <sup>1, 2\*</sup>, Daniel Kaiser <sup>1, 3</sup>

<sup>1</sup> *Mathematical Institute, Department of Mathematics and Computer Science, Physics, Geography, Justus-Liebig-Universität Gießen, Germany,* <sup>2</sup>*Neural Circuits, Consciousness and Cognition Research Group, Max Planck Institute for Empirical Aesthetics, Frankfurt am Main, Germany,* <sup>3</sup>*Center for Mind, Brain and Behavior (CMBB), Philipps-Universität Marburg and Justus-Liebig-Universität Gießen, Marburg, Germany*

Predictive processing theories propose that efficient real-world vision is achieved by comparing incoming sensory data with predictions generated from internal models. Given their pivotal role in perception, can individual differences in these models account for idiosyncrasies in perception? We used an inter-subject representational similarity analysis framework to explore whether idiosyncratic variation in scene perception and gaze behavior can be predicted by similarities in individuals' internal models of the world. To characterize these internal models, participants drew prototypical versions of indoor scenes. Inter-subject representational dissimilarity matrices (IS-RDMs) were constructed by quantifying similarities in these drawings across all pairs of participants, utilizing feature maps extracted from a deep neural network.

Behavioral IS-RDMs were constructed capturing inter-subject similarities across various performance metrics: (i) a categorization task involving indoor scene photographs, (ii) five subjective ratings (typicality, familiarity, attractiveness, usability, and complexity) of the same photographs, and (iii) gaze behavior in a free-viewing paradigm. Comparing IS-RDMs from the drawings with behavioral IS-RDMs revealed shared inter-subject similarities between participants' drawings (and thus their internal models) and (i) categorization efficiency, as well as (ii) ratings of typicality, usability, and complexity. A preregistered replication confirmed the link between shared internal models and shared categorization performance. However, no significant correlation was observed between IS-RDMs derived from participants' typical drawings and IS-RDMs based on inter-subject similarities in the fixation counts or gaze dwell times on objects.

Overall, we demonstrated a robust link between internal models and variation in perception, but more work is needed to establish connections to scene exploration.

**Keywords:** Scene perception, Predictive Processing, Mental representation, Individual differences, Drawing, Representational similarity analysis (RSA), Eye-tracking

**Presentation type:** Original Research Talk

## **Spatial cueing of distractor location and top-down inhibition in auditory selective attention**

Luigi Falanga \*, Laurin Behrens , Sophia Weckop , Iring Koch

*RWTH Aachen University, Institute for Cognitive and Experimental Psychology*

In complex auditory environments, selective attention enables individuals to prioritize relevant acoustic information while minimising interference from surrounding distractors. However, it remains unclear whether advance knowledge about distractor's location can facilitate selective listening through top-down inhibitory processes. In this study, twenty-eight participants performed a binaural listening task categorizing the magnitude of an auditory target stimulus (number word) presented from one of four loudspeaker locations, with an interfering distractor simultaneously presented in 66% of trials. In half of the blocks, the distractor location was spatially cued before stimulus onset, enabling proactive inhibition of a potential distractor location. To assess distractor interference during target processing, we manipulated the congruency between the target and distractor stimuli at the response level. In addition to distractor presence (distractor presence vs. absence), cueing (cued vs. uncued), target-distractor congruency (congruent vs. incongruent stimuli), also the cue-stimulus interval (CSI: 200, 800, 1500 ms) was systematically manipulated to assess preparatory top-down inhibition. Results showed that distractor presence impaired overall listening performance, particularly when the target and distractor elicited incongruent responses compared to congruent responses (i.e., congruency effect). Spatial cueing of the distractor location improved performance on distractor-present trials, suggesting that prior knowledge of the distractor location facilitates selective listening. This benefit of distractor cueing, however, was dependent on preparation time, with improvements observed only at longer CSIs. Notably, cueing did not influence performance in distractor-absent trials, ruling out cue-induced target enhancement. These findings suggest that foreknowledge about the distractor's location supports auditory selective attention through a top-down inhibitory mechanism.

**Keywords:** distractor cueing, auditory selective attention, inhibition, cognitive control

**Presentation type:** Original Research Talk

## **Distractors in visual search tasks require more suppression when associated with a high reward**

Tobias Feldmann-Wüstefeld <sup>1, 2\*</sup>, Emily Taylor <sup>3</sup>, Eva Wiese <sup>1</sup>

<sup>1</sup> *TU Berlin*, <sup>2</sup>*Alexander-von-Humboldt-Stiftung*, <sup>3</sup> *University of Southampton*

Attention deployment towards a stimulus is strongly influenced by its associated value, shaped by past experiences and learning history. Earlier research found that distractors associated with higher rewards cause greater interference (slower response times and reduced accuracy) with finding a target in visual search tasks. This study aimed to uncover the neural mechanisms driving this value-based attention bias, focusing on three attentional sub-processes: enhancement of relevant information, attentional capture by irrelevant information, and suppression of irrelevant information. We confirmed prior findings that high-reward distractors lead to more interference compared to low-reward distractors. Furthermore, a spatial gradient of interference was observed: performance dropped as distractors approached the target. The gradient was more pronounced for high-reward distractors.

Electrophysiological data from EEG provided insights into the mechanisms underlying this interference. High-reward distractors required stronger suppression, as shown by larger Pd components, particularly when these distractors were located near the target. This need for increased suppression reduced the resources available for target processing, evidenced by smaller target-N2pc amplitudes. Interestingly, the distractor-N2pc, a marker of attentional capture, was unaffected by either reward or proximity, suggesting that attentional capture alone does not explain interference caused by high-value stimuli.

In summary, our results show that the higher need for suppression of high-value stimuli contributes to reward-modulated attention deployment and increased suppression can prevent attentional capture of high-value stimuli.

**Keywords:** visual attention, suppression, reward, learning, EEG, visual search

**Presentation type:** Original Research Talk



## **Cross-modal semantic influences on visual search efficiency: Semantically congruent auditory primes guide visual attention**

Timea Folyi \*, Michaela Rohr , Lisa Peuckmann , Dirk Wentura

*Department of Psychology, Saarland University*

When searching for visual targets in complex and cluttered scenes, sounds can be highly effective in conveying target-related information due to the unique characteristics of auditory perception. Accordingly, several lines of evidence demonstrated that task-irrelevant sounds can be beneficial for visual search when they are meaningfully related to the search target, yielding a reaction time benefit. The aim of the present study was to investigate the processes underlying this benefit. In three experiments varying stimulus complexity and number of potential targets, participants were presented with auditory primes that were semantically congruent, neutral, or incongruent with the visual search target. Importantly, we varied the set size of the search displays, which allowed us to test the influence of priming on visual search slopes. Priming effects in a visual search context might be explained by post-search processes (e.g., facilitation of target encoding; McNamara, 2013), which would predict a set size-independent priming effect. Alternatively, auditory priming might serve as a source of guidance for visual attention (e.g., Wolfe, 2021) toward the primed target, leading to higher search efficiency with congruent priming. Visual search became more efficient when the task-irrelevant sound was congruent with the target compared to incongruent trials, as indicated by flatter search slopes. The results support that semantically congruent auditory primes can guide visual attention, and the potential mechanisms that influence attentional guidance are discussed in terms of multiple-target search. The results contribute to our understanding of how auditory cues can rapidly and involuntarily influence visual search behavior.

**Keywords:** attention, visual search, priming, cross-modal

**Presentation type:** Original Research Talk

## Modeling the Cognitive Processes Underlying Intuitive and Deliberate Decisions

Sarah Forst <sup>1\*</sup>, Andreas Glöckner <sup>2</sup>, Marc Jekel <sup>2</sup>

<sup>1</sup> *Chair of Experimental Psychology, School of Social Sciences, University of Mannheim*, <sup>2</sup>*Chair of Social Psychology, Department of Psychology, University of Cologne*

The importance of unconscious, automatic processes in judgment and decision-making is increasingly recognized today. However, it remains unclear whether and how intuitive decisions differ from controlled, deliberate decisions in terms of the underlying cognitive processes. In an online experiment with  $N = 140$  participants, a cognitive modelling approach was used to investigate how the instruction to make intuitive or deliberate decisions affects the choice between two stocks based on probabilistic information from four experts. Across analyses, results indicated that the information integration process underlying both intuitive and deliberate decisions can be modeled by an automatic consistency maximization process, as formalized in the parallel constraint satisfaction model of decision making (PCS-DM). PCS-DM with per-person fitted parameters ( $PCS_{\text{fitted}}$ ) effectively accounted for choices, decision times, and confidence in both decision modes. Strategy classification analyses revealed no significant difference in the distribution of decision strategies between conditions, with around 80% of participants using weighted compensatory strategies ( $PCS_{\text{fitted}}$ ,  $PCS_{\text{fix}}$ ,  $WADD_c$ ) compared to simpler, serial heuristics (TTB, EQW). This was found despite observed differences such as longer decision times and higher average performance in the deliberate condition. We interpret our results as supporting the assumption of comparable basic cognitive mechanisms underlying both intuitive and deliberate decisions. We argue that future studies should further investigate individual and task differences and emphasize the potential of computational modeling approaches to provide evidence for or against the assumption of dual processes.

**Keywords:** multi-attribute decision-making, judgment, parallel constraint satisfaction, intuition, dual-process models, computational modeling

**Presentation type:** Original Research Talk

## **Assessing an Accessible Mobile Eye-Tracker: Evaluation of the Pupil Neon**

Valentin Foucher \*, Alina Krug , Marian Sauter

*General Psychology, Ulm University*

With the rapid adoption of mobile eye-tracking devices in academic and consumer research, ensuring data reliability is increasingly important. This study offers an independent evaluation of the Pupil Neon (Pupil Labs GmbH), a new affordable, user-friendly mobile eye-tracker requiring no calibration, by comparing its performance to the established gold-standard EyeLink 1000 Plus (SR Research Ltd.) on a variety of tasks. Using Ehinger et al. (2019)'s test battery, a set of 10 tasks evaluated the accuracy and its decay over time of some of the most common eye-tracking-related parameters. This includes fixations on a large grid to assess spatial accuracy, smooth pursuits, free viewing to evaluate eye movements and gaze trajectories, microsaccades, blinks, pupil size variations, fixations on a small grid to evaluate the decay of accuracy over time, fixations during head yaw and head roll movements, and fixations on a small grid after head movements to assess their influence on accuracy. Gaze position, eye movements and pupil diameter associated with each task were recorded simultaneously by the two eye-trackers for direct comparison. The results provide valuable insights into the Pupil Neon's specific characteristics and performance in recording various eye movements and performing different tasks. These findings will help identify situations where the Pupil Neon excels and highlight tasks that might be less advisable to conduct with this device due to differing eye movement considerations, guiding researchers in aligning device performance with the requirements of their studies.

**Keywords:** Eye-tracking, mobile eye-tracker, Pupil Neon, Eyelink 1000 Plus, performance evaluation

**Presentation type:** Original Research Talk

## **The Influence of Task Demands on Joint Action Planning**

Kassandra Friebe \*, Günther Knoblich

*Central European University*

We frequently engage in joint actions, where individuals coordinate to bring about changes in the environment. Such joint actions require planning of individual contributions and joint components

beyond the individual level. Previous research suggests that specialized joint action plans integrate self and partner contributions to facilitate coordination.

One proposal is that co-actors generally prioritize joint-level planning over individual-level planning, as has been demonstrated in joint tasks requiring close coordination. Alternatively, co-actors may engage in joint-level planning only when it allows them to use joint-level information to better prepare their individual contributions.

Across four experiments (N = 24 each), we investigated when joint action partners adaptively choose between individual and joint action plans based on task demands. Participants performed a joint computer task requiring them to select one of two blocks to create a joint pattern. Two cues were presented before task specification: Joint cues indicated the relation between contributions, while individual cues specified either their own or their partner's contribution. We manipulated the difficulty of integrating individual contributions with their outcomes and the sequence of presenting individual- and joint-level information during a joint task.

Response times were consistently shorter when joint cues specified the relation between individual contributions in partner trials. Crucially, joint cues benefitted task performance in self trials when the cues allowed participants to directly associate individual actions with outcomes.

These results suggest that co-actors strategically switch between joint and individual planning, but joint planning can take precedence when individual actions link directly to their outcomes.

**Keywords:** Joint action, social cognition, action planning

**Presentation type:** Original Research Talk

## **Hard Tasks Create Strong Bindings: Prefrontal Correlates of Task Difficulty and Response-Response Binding Effects**

Christoph Geißler <sup>1\*</sup>, Birte Moeller <sup>1, 2</sup>, Bernhard Pastötter <sup>1, 2</sup>, Christian Frings <sup>1, 2</sup>, Lars-Michael Schöpper <sup>1, 2</sup>

<sup>1</sup> *Trier University, Institute for Cognitive & Affective Neuroscience (ICAN)*, <sup>2</sup>*Trier University, Cognitive Psychology*

In action control research it is assumed that actions and surrounding features have to be temporarily bound together to form action plans. Subsequent repetition of any bound feature can trigger retrieval of previously formed bindings, leading to performance costs for partial repetitions, measured in so-called binding effects. Notably, although generally robust, previous research has shown that binding effects are often reduced or completely absent in easy or overlearned tasks. In a

previous distractor-response binding study (Geissler et al. 2024), we employed functional near-infrared spectroscopy and could show that this reduction in binding effects is correlated to task-related processing in the dorsolateral prefrontal cortex. That is, stronger task-related processing went along with larger binding effects. However, due to temporal limitations in the distractor-response binding paradigm, we could not further pinpoint whether increases in prime- or probe-related processing led to stronger binding effects. In a previous functional near-infrared response-response binding study (Geissler et al. 2021), we could show neural binding effects specifically in probe-related dorsolateral prefrontal cortex activation. In the current study, we measured neural activity with functional near-infrared spectroscopy and electroencephalogram during a response-response binding paradigm with an easy target response mapping and a response-response binding paradigm with a difficult target response mapping. We expect binding effects and prefrontal activation to increase with task difficulty. Further, due to the greater temporal stability of response-response bindings, we can distinguish between prime- and probe-related prefrontal activity and thus will be able to more clearly pinpoint how prefrontal processing might lead to binding effects.

**Keywords:** Action Control, Response-Response Binding, Task Difficulty, Electroencephalogram, Functional Near-Infrared Spectroscopy, Dorsolateral Prefrontal Cortex

**Presentation type:** Original Research Talk

## **Compromising on Moral Issues: Individual versus Collective Moral Judgement**

Markus Germar <sup>1\*</sup>, Thomas Schutze <sup>2</sup>, Andreas Mojzisch <sup>1</sup>

<sup>1</sup> *University of Hildesheim*, <sup>2</sup>*University of Bamberg*

Although moral judgments often emerge from social interactions (e.g., ethic committees), past research rarely addressed two fundamental questions: 1.) Do individual moral judgements differ from collective judgments (i.e., moral judgments made by groups)? 2.) Does making moral judgments collectively change subsequent individual moral judgments?

In two preregistered study, we investigated these questions. Participants judged ten moral dilemmas. Specifically, they judged two choice options (deontological vs. utilitarian option) concerning two dimensions, namely the moral acceptability and the moral requiredness of each option. First, participants judged the dilemmas individually, then, in groups, and, finally, individually again. We tested two competing hypotheses. Past research suggests that collective judgments are more utilitarian than individual judgments (a phase × option – interaction; Hypothesis 1a).

Specifically, participants' preference for the utilitarian (deontological) option will increase (decrease) from the first individual phase to the collective phase. However, past research also allows for the hypothesis that groups will agree on the least common denominator among members (a phase  $\times$  dimension – interaction, Hypothesis 1b). Specifically, the acceptability (requiredness) of both options will increase (decrease) from the first individual phase to the collective phase. Our results reveal evidence against Hypothesis 1a and in support of Hypothesis 1b. Furthermore, our results show that collective moral judgments tend to polarize towards the majority opinion within the group and that collective moral judgments change subsequent individual moral judgments.

**Keywords:** moral judgement, group psychology

**Presentation type:** Original Research Talk

## **In the Face of Uncertainty: How Robots' Appearance Shape Mind Perception.**

Yasmina Giebeler \*, Nueud Kassaye , Basil Wahn , Eva Wiese

*Technische Universität Berlin, Germany*

Understanding how humans perceive robots is essential for improving human-robot interaction. While users readily attribute agency-related capacities (ability to act and plan) to robots, they are hesitant to explicitly ascribe experience (ability to feel and sense). However, as humans have demonstrated social behaviour towards robots, this reluctance may not only be due to lower expectations of finding this ability in robots, but also arise from a subjective feeling of violating social norms. This study aims to disentangle explicit and implicit processes underlying mind perception and how robots' physical features shape perception of agency versus experience.

Participants evaluated 20 robots grouped by body and face prominence across eight items measuring capacities to act, plan, feel, and sense. Mouse cursor tracking captured decision-making dynamics. Data Collection will be finalized by December. We hypothesize that robots will generally be rated higher in agency than experience, with appearance influencing these ratings: Robots with pronounced facial features are expected to receive higher experience ratings, while those with complex body features will score higher in agency. Greater uncertainty is anticipated in attributing experience compared to agency, with differences in uncertainty when affirming versus denying mind-related capacities.

A 2x4 repeated measures ANOVA will assess explicit mind perception ratings, while a 2x2 ANOVA will analyze mouse trajectories to investigate decision-making uncertainty. Results will clarify how robot appearance influences mind perceptions, offering insights for designing robots that align with

human expectations. This research will benefit the ethical and effective integration of robots into social contexts, improving interaction and acceptance.

**Keywords:** Human-Robot Interaction, Social Cognition, Mind Perception, Social Robots, Implicit Measure

**Presentation type:** Original Research Talk

## **Visual memory capacity is susceptible to multiple influences during more naturalistic encoding**

Sharon Gilaie-Dotan \*, Reout Dayan , Olga Kreichman

*Faculty of Life Science School of Optometry and Vision Science and The Gonda Multidisciplinary Brain Research Center, Bar Ilan University, Ramat Gan, Israel*

Although studies show that human visual memory for object images is phenomenal during active engaging encoding, it is still unclear if this reflects memory during naturalistic visual behavior. Recent studies in our lab show that during naturalistic encoding, image memory is much poorer than the levels reported earlier and that the knowledge that an image was not seen before was much higher than the recognition memory for already-seen images. Here in a set of comprehensive experiments (n=249) we parametrically examined whether during more naturalistic-like encoding, memory for object images is robust or susceptible to multiple factors. Our earlier results with face, people, indoor and outdoor images were first replicated with object images. In addition, we found that during these less engaging encoding conditions people's memory was adversely affected by the number of encoded images and by the number of novel (distractor) images the previously seen image was tested amongst (from best performance of ~90% memory in a 2AFC task for 60 encoded images down to ~50% memory in a 6AFC task for 180 encoded images). While our capacity for remembering new images can reach outstanding levels during highly engaging conditions, our results indicate that during more naturalistic-like conditions, image memory is much weaker and susceptible to multiple influences. We assume that our findings overestimate everyday visual memory capacity and that much less of the novel information we come across everyday actually registers in memory.

**Keywords:** visual memory, image memory, visual categories, naturalistic encoding, memory capacity

**Presentation type:** Original Research Talk

## **Analysis of the Influence of Biofeedback on Self-Regulation during Phases of High Workload**

Sophie Glaab <sup>1\*</sup>, Rik Anhalt <sup>2</sup>, Alexander Biedermann <sup>1</sup>

<sup>1</sup> *Technische Hochschule Aschaffenburg*, <sup>2</sup>*Technische Universität Darmstadt*

This study investigates the influence of biofeedback on self-regulation and performance. We employed a directed non-specific difference hypothesis with an a priori approach. The between-subject design featured biofeedback as independent variable and performance, operationalized by points gain in a game setup, as dependent variable.

Heart rate variability (HRV) was measured as an indicator of workload while participants engaged in a specially designed computer game featuring a continuous control task. Workload was periodically increased by temporarily adding mini-games. When a participant's HRV fell below an individually predetermined threshold, the "biofeedback mode" was activated, consisting of a visually and aurally intensified interface in order to reflect the user's HRV response to the workload. The game reverted to normal mode once HRV increased.

The participants were divided into three groups. The first group was informed about the biofeedback mode and was encouraged to use stress-reduction strategies during its activation. The mode, however, was statically triggered at fixed intervals regardless of HRV measurements. The experimental group experienced activation of the mode based on real-time HRV measurements. The control group was exposed to the same behaviour as the experimental group, without being informed about the biofeedback mode or its purpose.

Statistical analysis revealed no significant effect of biofeedback on overall performance. However, performance during biofeedback phases significantly decreased for both the first and the experimental group, an effect not observed in the control group. This may indicate that confronting a user with their – even just supposed - overload might have a negative effect on performance.

**Keywords:**

**Presentation type:** Original Research Talk



## Accurately acting on moving stimuli requires a higher fidelity motion representation than perceptual discrimination

Alexander Goettker <sup>1, 2\*</sup>, Ilja Wagner <sup>1, 2</sup>, Scott Murdison <sup>3</sup>, Karl Gegenfurtner <sup>1, 2</sup>

<sup>1</sup> Justus Liebig University Giessen, <sup>2</sup> Center for Mind, Brain and Behavior, Universities of Marburg, Giessen, and Darmstadt, <sup>3</sup>Reality Labs, Meta Platforms Inc.

The human visual system evolved to process and interpret continuous visual input. However, visual signals in modern societies increasingly emanate from digital displays, which emulate continuous motion by presenting a series of discrete frames at some fixed temporal frequency. How does non-continuous, sampled motion influence visual perception and action? We asked participants to complete a combined oculomotor and speed-discrimination task, where they tracked the motion of a stimulus via smooth pursuit eye movements and compared the velocity of the pursuit stimulus to a reference velocity. Motion quality was manipulated by presenting discrete frames at different temporal frequencies (120, 60, 30, 15 Hertz), covering a range of values corresponding to different motion qualia, from quasi-continuous (120 Hertz) to highly discontinuous (15 Hertz). We found that participants could reliably discriminate velocities, even at low refresh rates. Pursuit accuracy, however, declined with decreasing refresh rate and increasing target velocity: a perception-action dissociation. The decline in pursuit accuracy can be explained by a model, which estimated a proxy for motion quality from the spatiotemporal energy profile of stimuli. Using this estimate, our model predicts pursuit accuracy for arbitrary combinations of target velocity and refresh rate. Our results highlight the dissociation between perception and action in digital displays with sampled motion; while we may be able to accurately discriminate motion at reduced frame rates, acting on moving stimuli requires a higher fidelity motion representation.

**Keywords:** Eye Movements, motion perception, applied perception

**Presentation type:** Original Research Talk

## The anticipation of events in time

Matthias Grabenhorst <sup>1, 2\*</sup>, David Poeppel <sup>3</sup>, Georgios Michalareas <sup>1, 2, 4</sup>

<sup>1</sup> *Ernst Strüngmann Institute for Neuroscience in Cooperation with Max Planck Society, 60528 Frankfurt, Germany,* <sup>2</sup> *Max Planck Institute for Empirical Aesthetics, 60322 Frankfurt, Germany,*

<sup>3</sup> *New York University, 6 Washington Place, New York, NY 10003, USA,*

<sup>4</sup> *Goethe University Frankfurt, 60323 Frankfurt, Germany*

The anticipation of events in time allows for action preparation and fast responses. This talk investigates how the probabilities of whether and when future events will occur shape human behavior. To predict when an event will occur, neural systems need to estimate elapsed time and event probability over time. According to a prominent hypothesis, neural systems fulfill these computational demands by estimating the hazard rate of events. Based on psychophysical experiments and computational modeling, we show that humans estimate a simpler variable: the event probability density function (Grabenhorst et al., Nat Commun, 2019). Neural systems are imprecise clocks, introducing uncertainty to time estimation. A common hypothesis poses that temporal uncertainty linearly increases with time itself (scalar property). This implies independence between time estimation and event probability. In contrast, we demonstrate that event probability density modulates temporal uncertainty (Grabenhorst et al., Nat Commun, 2019). The probability of whether an event will occur is another fundamental variable in temporal anticipation. We show that this static occurrence probability has a highly dynamic effect on anticipation over time (Grabenhorst et al., PNAS, 2021). Finally, using magnetoencephalography, we show that the key variable in temporal anticipation – the event probability density – is represented in three neural signals, one in superior parietal lobule, one in inferior parietal lobule and posterior middle temporal gyrus and one in sensorimotor cortex, all prior to anticipated sensory cues (Grabenhorst et al., Nat Commun, 2025). Our results contribute to a mechanistic understanding of temporal anticipation – a fundamental process underlying many cognitive domains.

**Keywords:** time estimation, probability estimation, temporal prediction, probability representation, psychophysics, computational modeling, neural oscillations

**Presentation type:** Original Research Talk

## How gestures can affect the interpretation of speech

Alina Gregori <sup>1\*</sup>, Susanne Fuchs <sup>2,3</sup>, Bodo Winter <sup>4</sup>

<sup>1</sup> *Goethe University Frankfurt, Frankfurt am Main Germany*, <sup>2</sup>*Leibniz Zentrum Allgemeine Sprachwissenschaft, Berlin Germany*, <sup>3</sup> *Iméra & ILCB at Aix-Marseille Université, Marseille France*,

<sup>4</sup> *University of Birmingham, Birmingham UK*

The interplay of speech and gesture has communicative effects [1]. We explore the function of disambiguating an ambiguous expression, “Next Wednesday’s meeting has been moved forward two days. On what day is it now?”, by means of gestures and speech. We run a study where participants (n=274) watch a video of a speaker saying the sentences above accompanied by a directional gesture, and answer the question (cf. [2]). We manipulate Gesture Direction (forward/backward) and Gesture Position (adverb/verb/sentence-final). In the latter two cases, the adverb “forward” is not said, leading to another factor Adverb Presence (adverb/none). We run Bayesian logistic regression models over “Monday”/ “Friday” responses. Results show a Gesture Direction effect: the forward gesture is associated with “Friday”, the backward gesture more with “Monday”. We find a Gesture Position effect with the adverb position being associated with “Monday”, while verb and sentence-final positions are associated with “Friday”. However, this effect is likely rather an Adverb Presence effect, due to the adverb being present in the first Gesture Position, but not in the latter two. We find disambiguation effects of gesture and speech, that influence the response to the stated question in specific directions. Gesture and speech may work together to disambiguate but are able to cancel out each other’s effect.

[1] C. Ebert, S. Evert, & K. Wilmes, “Focus marking via gestures,” *Proc. Sinn und Bedeutung*, 2011.

[2] B. Winter & S. E. Duffy, “Can co-speech gestures alone carry the mental time line?,” *J. Exp. Psychol. Learn. Mem. Cogn.*, 2020.

**Keywords:** Gesture, Speech, Multimodality, Perception, Disambiguation

**Presentation type:** Original Research Talk

## The Influence of Emotion and Group Features in the Evaluative Priming Task

Emre Gurbuz \*, Michaela Rohr , Dirk Wentura

*Saarland University*

Evaluative priming (EP) studies using face primes revealed priming effects based on the evaluative meaning of some features, such as emotional expression and group membership. Ingroup and happy faces are associated typically with positive, whereas outgroup and fearful faces are linked to negative valence. These features can influence evaluations independently or interactively. Interactive effects, with happy ingroup and fearful outgroup faces perceived as more positive than their counterparts (happy outgroup, fearful ingroup), support the social message account (Paulus & Wentura, 2014). However, evidence for both independent and interactive processing in published EP studies remains puzzling. In the presented studies, we investigated potential causes: First, we examined whether increasing prime task relevance, typically absent in standard EP, would promote interactive processing. Introducing a secondary task requiring attention to the primes still yielded independent effects of emotion and group. Second, we tested whether a temporal delay between group and emotion cues (using neutral-to-emotional dynamic expressions) would allow the delayed feature (emotion) to be processed alongside the pre-processed feature (group). The results again supported independent processing. Lastly, increasing the prime duration from 100 ms to 200 ms (and thereby SOA from 200 to 300 ms) provided weak evidence for an interaction: Happy ingroup faces were evaluated more positively than happy outgroup faces and fearful ingroup faces more negatively than fearful outgroup faces. These findings suggest longer presentation durations (and/or increased SOA) might facilitate interactive processing, highlighting the need for further investigation into how temporal characteristics of facial primes shape emotion and ethnicity evaluations.

**Keywords:** emotional expression, group membership, evaluative priming

**Presentation type:** Original Research Talk

## Neurocognitive Psychometrics of interindividual Differences in Working Memory

Jan Göttmann <sup>1\*</sup>, Daniel Schneider <sup>2</sup>, Anna-Lena Schubert <sup>1</sup>

<sup>1</sup> *Johannes Gutenberg-Universität Mainz*, <sup>2</sup>*Leibniz-Institut für Arbeitsforschung an der TU Dortmund*

Measuring individual differences in working memory processes is challenging, particularly if one is interested in the question which specific aspect of working memory capacity is most relevant for individual differences in cognitive abilities. Mathematical models can address this issue, as they are capable of mapping processes of interest with parameters that are mathematically derived from hypotheses about the nature of these latent processes.

The Memory Measurement Model framework (M3; Oberauer & Lewandowsky, 2018) consists of a collection of such cognitive measurement models that isolate parameters associated with distinct working memory processes, such as the formation of bindings or the filtering of irrelevant distractors, in widely used paradigms like simple or complex span tasks. Based on simulations, we developed a series of experiments for different stimulus modalities, tailored to estimate the parameters of the M3 complex span models and to be concurrently used for electrophysiological research.

We demonstrate that the estimated parameters are related to specific neurocognitive processes such as the P300 and the CNV and are capable of mapping individual differences in these processes. We will discuss how this neurocognitive psychometric approach enables more precise measurement of latent working memory processes and whether model parameters can be mapped to neurocognitive correlates.

**Keywords:** Working Memory; Cognitive Modeling; Psychometrics;

**Presentation type:** Original Research Talk

## Perception knows no inhibition of return (IOR)

Nina Hanning <sup>1, 2\*</sup>, Qingyuan (Rachel) Chen <sup>2</sup>, Marisa Carrasco <sup>2</sup>

<sup>1</sup> *Department Psychologie, Humboldt-Universität zu Berlin*, <sup>2</sup>*Department of Psychology & Center for Neural Science, New York University*

Attention enhances visual processing, leading to improved sensitivity (discrimination performance) and faster reaction times (RT). It can be deployed voluntarily (endogenous attention) and sustained over prolonged periods, or captured automatically (exogenous attention), where an early enhancement is followed by a quick decline that may even reverse into a cost. This latter effect – inhibition of return (IOR)– is typically observed with RT, but not with sensitivity measures.

We investigated the temporal dynamics of exogenous attention on visual sensitivity. Participants performed a non-speeded orientation discrimination task. Tilted Gabor patches were presented at either one of four isoeccentric cardinal locations, or at one of two opposing locations along the horizontal or vertical meridian (blocked). A salient, non-predictive cue was randomly presented between 450ms before and 200ms after the test Gabor, either at the same location (valid), or the mirrored location opposite to fixation (invalid).

Results revealed that the effect of exogenous attention (valid vs. invalid discrimination performance) critically depends on the number of monitored locations: With two opposing locations, consistent with previous studies, the benefit peaked shortly after the cue and returned to baseline within 200ms. In contrast, with four possible locations, the benefit persisted beyond 450ms. Crucially, sensitivity at the cued location was never inferior to that at the invalid location, regardless of test location number. These findings suggest that IOR reflects motor inhibition, and is thus typically observed in RT measures. Perception, however, is not inhibited and –depending on the number of monitored locations– can continue to benefit from exogenous attention.

**Keywords:** visual spatial attention, exogenous attention, sensitivity measures, temporal dynamics

**Presentation type:** Original Research Talk

## Attentional guidance during multi-attribute decisions from memory

Eva-Marie Heißler <sup>1\*</sup>, Yvonne Oberholzer <sup>2</sup>, Antonia Krefeld-Schwalb <sup>3</sup>, Agnes Rosner <sup>1, 4</sup>

<sup>1</sup> *Leibniz University Hannover*, <sup>2</sup> *Karlsruher Institute of Technology*, <sup>3</sup> *Rotterdam School of Management*, <sup>4</sup> *University of Zürich*

Internal attention has been shown to guide choice. However, research suggests different processes to explain the observed behavior: For one, a change in integration strategy (compensatory or non-compensatory) and alternatively, an increase in decision weights for attended information. In this study, attribute information for the decision has to be retrieved from memory and a retro-cue paradigm is used to guide attention to one of several attributes shared between alternatives. We find more fixations to the cued attribute and more choices of the alternative scoring higher on that cued attribute. This is in line with the hypothesis of increased decision weights. There is no evidence of a strategy change in the behavioral results.

Explorative analyses revealed that fixations during encoding predict choice: fixations on negative attribute information reduced and fixations on positive information increased choice for the respective alternative. This is in line with an information integration account of choice. During the retention and choice-phase, however, the fixated alternative, rather than the specific attribute information mattered. That is, even if the attribute information is negative, the probability of choosing this alternative increased. This is in line with the gaze-cascade model. These results suggest that attention is indicative of different information processing, throughout the process. During encoding, attention might reflect information acquisition of individual attributes, while during the retention and choice-phase, attention might reflect consolidating preferences for the entire alternative.

Studying eye movements during different phases of the choice process advances our theoretical understanding of the role of attention during decision making.

**Keywords:** internal attention, retro-cues, preferential choice, eye-tracking

**Presentation type:** Original Research Talk

## **Do pointers' choices of finger-referent distances reflect their representations of pointing accuracy?**

Oliver Herbort <sup>\*</sup>, Lisa-Marie Krause

*Julius-Maximilians-Universität Würzburg*

Pointing gestures are a cornerstone of human communication. However, to use them effectively requires some understanding of how accurate pointing is. One hypothesis is that humans represent the accuracy of their pointing gestures by means of a pointing cone. This cone is thought to protrude from the pointing finger and encompasses all objects that might be considered pointed-at. Here, we tested this hypothesis by asking participants to walk toward and point at one of several cities on fictive maps. We expected that participants walked as close to the map, as was necessary to make the pointing gesture unambiguous. If participants relied on a pointing cone to choose from which distance to point, we expected the chosen pointer-to-map-distance to depend linearly on the distance between the referent and adjacent cities. This expectation was borne out in a series of experiments. However, participants went much closer to the map than would be expected from the pointing-cone hypothesis. The data suggest that while a pointing-cone like representation might be involved in choosing how we employ pointing gestures, other factors seem to play a far more important role.

**Keywords:** Pointing, Gesture, Communication, Embodiment, Uncertainty

**Presentation type:** Original Research Talk

## **A Task Conflict Gradient in The Gestalt-Color-Digit Stroop Task**

Ronen Hershman <sup>1\*</sup>, Eldad Keha <sup>2,3</sup>, Lisa Beckmann <sup>4</sup>, Avishai Henik <sup>5</sup>, Ayelet Sapir <sup>6</sup>

<sup>1</sup> *University of Innsbruck, Innsbruck, Austria*, <sup>2</sup>*The Hebrew University, Jerusalem, Israel*, <sup>3</sup>*Achva Academic College, Beer-Tuvia, Israel*, <sup>4</sup>*Ludwig-Maximilians-Universität München, Munich, Germany*, <sup>5</sup> *Ben-Gurion University of the Negev, Beer-Sheva, Israel*, <sup>6</sup>*Bangor University, Bangor, UK*

In cognitive control tasks, participants are presented with stimuli and are instructed to respond to one task-relevant dimension while ignoring another task-irrelevant dimension(s). In such experiments, task conflict reflects the additional effort associated with performing two tasks, such as identifying the color while reading the word in the color-word Stroop task, and is indicated by the difference between conditions that consist of two tasks (congruent and incongruent trials) and



conditions that only consist of one task (neutral trials). In a series of three experiments, we used the color-digit Stroop task and manipulated the processing difficulty associated with the irrelevant dimension of the presented stimuli. We found that while information conflict was evident in all conditions, a gradient of task conflict was observed so that the more difficult it was to perceive the task-irrelevant dimension, the stronger task conflict was. We suggest that task conflict is present even when there is no evidence for it and that a critical condition for its appearance is the resources allocated to the irrelevant task. Moreover, these results suggest that our ability to inhibit the involuntary activation of an unwanted process is restricted. Therefore, despite the resource-intensive usage of completing the irrelevant task, it still takes place.

**Keywords:** Automaticity, numerical cognition, Stroop effect, task conflict, cognitive control

**Presentation type:** Original Research Talk

## Towards New Horizons in Cultural Empirical Aesthetics

Jimpei Hitsuwari <sup>1, 2\*</sup>, Thomas Jacobsen <sup>1</sup>

<sup>1</sup> *Helmut Schmidt University*, <sup>2</sup> *Japan Society for the Promotion of Science*

As with many other research fields, much of the work in empirical aesthetics has emerged from the West (e.g., Jacobsen, 2006). While this body of research is highly valuable—given that the concepts of beauty and art were born and have been deeply explored in this region—it is crucial to recognize that the environments where people develop—including education, language, and social norms—shape their cognitive schemas and aesthetic processing (Jacobsen & Beudt, 2017). Therefore, the horizons of empirical aesthetics could be further expanded by incorporating the aesthetic traditions and experiences of different cultures. In this presentation, we will introduce a range of our comparative experimental studies between Japan and Germany, including haiku poetry (Hitsuwari & Nomura, 2022), gagaku dance (Hitsuwari et al., 2024), and Japanese calligraphy (Sprengel et al., in preparation). For example, Hitsuwari & Nomura (2022) showed that while both Japanese and German participants lowered their aesthetic evaluation of haiku as ambiguity increased, this decrease was more gradual among Japanese participants. This suggested that Japanese people are more familiar with ambiguity in language and communication, and are more accustomed to appreciating artworks that offer multiple interpretations. Thus, we provide an overview of the cultural comparative research conducted in empirical aesthetics to date. This overview will not only cover various topics (stimuli) mentioned above, but will also integrate theoretical perspectives such as perceptual (e.g., symmetry and asymmetry; Leder et al., 2024) and

social (e.g., national/cultural identity; Darda & Cross, 2022) viewpoints, as well as aesthetic qualities like wabi-sabi.

**Keywords:** Empirical aesthetics, Cultural differences, Social norms, Haiku poetry, Gagaku dance, Calligraphy, Ambiguity

**Presentation type:** Original Research Talk

## **Neural networks for volitional movement generation - evidence from neuroimaging meta-analysis**

Felix Hoffstaedter <sup>1, 2\*</sup>, Robert Langner <sup>1, 2</sup>, Simon Eickhoff <sup>1, 2</sup>

<sup>1</sup> *Institute of Neuroscience and Medicine (INM-7), Forschungszentrum Jülich*, <sup>2</sup>*Institute of Systems Neuroscience, Heinrich-Heine University Düsseldorf*

Since the discovery of the 'readiness potential', various studies have examined neural correlates of volitional behavior by analyzing 'self-initiated' or 'internally generated' movements, despite the obvious contradiction between experimental control and volitional in-determination. There is evidence for distinct neural sub-networks involved in different aspects of movement generation from planing of (1) specific movements to be executed or movement choice and (2) the timing of movement initiation or execution timing. Many studies have experimentally separated different aspects of volitional movement generation applying a multitude of imaging methods. In this study, we conducted an 'Activation Likelihood Estimation' meta-analysis on 78 fMRI and PET experiments to map out the spatial layout of the functional networks involved. The key feature of experiments to include was the presence of at least 2 alternative choices, which were not determined by the experimental setup and resulted in a response. We compared the assessed volitional aspect, either a 'choice' between alternative movements or the internal 'timing' of movement execution with respect to non-volitional control conditions. As PET and fMRI block-design measure sustained activity across an experimental condition, within this sub-sample we examined task-set effects of volitional movement generation. Event-related fMRI analyses were pooled to dissociate movement preparation and execution. Volition includes sub-networks for internal choice and internal timing, with choice containing a state-related component for planing and a more phasic component linked to movement preparation. Timing consisted of a state- and an event-related component. A core network was identified prominently including anterior mid-cingulate cortex and pre-supplementary motor cortex.

**Keywords:** volition, internal movement generation, self-initiated movements, movement choice, movement timing, neuroimaging meta-analysis, activation likelihood estimation

**Presentation type:** Original Research Talk

## **A very large-scale eye tracking dataset of visual search**

Alex J. Hoogerbrugge \*, Stefan Van der Stichel , Christoph Strauch  
*Helmholtz Institute, Experimental Psychology, Utrecht University*

Do you look for that missing house key the same way as your children or parents? Visual search is a ubiquitous task in our daily lives, and thus an important topic of study. One way to study visual search which approximates daily tasks is with free eye movements in (controlled) natural scenes. However, eye tracking data is expensive to collect, often resulting in small and potentially biased samples of university students. We here present on our work collecting gaze data from several thousand participants of a wide age range, obtained with a research-grade eye tracker, in ongoing collaboration with the NEMO Science Museum in Amsterdam. Visitors performed a single trial of a free eye movement task, in which they searched for a low-contrast 'x' or '+' hidden within a collage stimulus. Targets could be in one of six locations which were designed to have various levels of difficulty. We present our findings on viewing patterns from thousands of participants, and how their demographics may affect accuracy and saliency. We furthermore discuss the benefits and pitfalls of such a citizen science approach to eye tracking, concerning data quality, hardware options, public engagement, and collecting and estimating the validity of demographic data without an experimenter being present. Our openly available dataset aims to provide high-quality, wide age range, gender-balanced, eye movement data from one of the largest samples to date.

**Keywords:** visual search, eye tracking, citizen science, public engagement

**Presentation type:** Original Research Talk

## A shopping tour down memory lane: How personal associations affect nostalgic consumption

Isabella Huber <sup>1\*</sup>, Stefan Ortlieb <sup>1, 2</sup>, Claus-Christian Carbon <sup>1, 2</sup>

<sup>1</sup> *Department of General Psychology and Methodology, University of Bamberg, Germany,*

<sup>2</sup>*Research Group for Ergonomics, Psychological Aesthetics and Gestalt (EPÆG), Bamberg, Germany*

Nostalgic consumption can be based either on personal recollections (direct nostalgia) or a sentimental connection to the past without first-hand experience (indirect nostalgia). Drawing on Fechner's Aesthetic Association Principle, we hypothesized that liking and purchase intentions should be increased if positive personal memories are involved. A two-stage online survey was conducted to compare the effects of direct and indirect nostalgia and the moderating influence of gender, age, nostalgia proneness (NP), and elaboration on liking and purchase intentions: 43 women and 21 men aged between 20 and 69 years provided personal associations and ratings of 14 different products (stage 1). One week later they filled in standardized questionnaires on NP and their attitude towards the past prior to rating the affective valence of their own associations from stage 1 (stage 2). We examined models predicting the dependent variables using a comprehensive nostalgia dimension versus distinguishing between direct and indirect nostalgia dimensions across the two measurement approaches for nostalgia. Generally, the more nostalgic associations- whether directly nostalgic or generally connected to the past- were reported about a product, the more likable and desirable it was perceived. Personal associations were mainly responsible for this interrelation. Based on standardized questionnaires the distinction between direct and indirect nostalgia was even clearer: Scores for direct nostalgia yielded a stronger positive effect on liking and desirability than those for indirect nostalgia. The partially differing results highlight the unique perspectives provided by qualitative and quantitative measurement approaches, underscoring the value of combining both for a more comprehensive understanding.

**Keywords:** aesthetic association principle, consumer psychology, nostalgia, nostalgic consumption, empirical aesthetics

**Presentation type:** Original Research Talk

## Reality Monitoring in Advice Taking: Whose Guess Was the Best Guess?

Johanna M. Höhs <sup>1\*</sup>, Beatrice G. Kuhlmann <sup>2</sup>, Mandy Hütter <sup>1</sup>

<sup>1</sup> University of Tübingen, <sup>2</sup> University of Mannheim

By combining a typical advice taking paradigm with a source monitoring task, the presented research investigates people's ability to discriminate between their own self-generated initial estimates and advice from different advisor sources. In a laboratory experiment ( $N = 154$ ), participants first provided their own calorie estimates for a number of different food items. Afterward, participants received advice on the calorie estimates from two different advisor sources of varying quality labeled as expert and lay advisors. Finally, participants completed a classic source monitoring task. In this task, participants indicated the source of the presented calorie estimates (own self-generated initial estimate, expert advisor estimate, lay advisor estimate or new estimate). Consistent with previous memory literature, the behavioral results indicate both better item and source memory for people's own self-generated initial estimate than for the external advice. However, using multinomial modeling that allows a separate measurement of memory and guessing processes, the modeling results reveal a complex guessing pattern. The presented work offers novel and fine-grained insights into the role of memory and guessing influences in advice taking.

**Keywords:** advice taking, source monitoring, multinomial modeling

**Presentation type:** Original Research Talk

## The tactile distance aftereffect transfers to curvature perception

Michaela Jeschke <sup>1\*</sup>, Elena Azañón <sup>2,3</sup>, Knut Drewing <sup>1</sup>

<sup>1</sup> Experimental Psychology, Justus-Liebig University Giessen, <sup>2</sup>Neurology, Otto-von-Guericke-University Magdeburg, <sup>3</sup>Leibniz Institute for Neurobiology

Curvature is an important parameter for haptic perception of 3d shapes. It can be spatially defined by length to height ratios. Here, we aim to determine if mechanisms involved in the rather complex processing of curvature overlap with the processing of the basic somatosensory feature tactile distance. For that, we leverage tactile distance adaptation-aftereffects. Specifically, we investigate whether adaptation to tactile distance affects subsequent curvature perception. As test stimuli we used convex curved strips of constant lengths but differing heights, producing varying curvature values ( $0.25$ ,  $0.18$ , and  $0.13 \text{ cm}^{-1}$ ), passively presented at participants' palms. Each trial, participants were first adapted to either 1) a distance larger than the length of the subsequently applied curve's length, 2) a smaller distance, 3) or punctual indentations as control for

desensitization. Afterwards, a two-interval forced-choice discrimination task followed: Test stimuli were compared at the unadapted versus adapted palm and participants judged which one had a higher curvature. We expected that after adaptation to a larger distance, the curve indentation area might be perceived as smaller than it de facto is. With its' base-to-peak-height staying constant, the gradient might then be perceived as steeper, i.e. the curvature as higher. Results confirmed that judged curvature indeed increased after adaptation to a large distance. Also, after adapting to a smaller distance, test stimuli were perceived as less curved. Single indentations barely affected subsequent perception. The existence of a cross-property aftereffect from distance to curvature highlights the importance of low-level spatial processing in tactile curvature perception.

**Keywords:** haptics, tactile perception, adaptation, spatial computation, shape, somatosensory processing

**Presentation type:** Original Research Talk

## Tool structure influences children's action planning in a social context

Bianca Jovanovic \*

*Justus-Liebig-University Giessen*

When 7-year-old children pass tools to others, they often fail to reorient them in order to provide beginning state comfort (turning the grip towards the other). The present study investigated if 7-year-old children's success in providing beginning state comfort in tool hand-over is influenced by tool structure and social cognition. Specifically, we tested whether the symmetry of an unfamiliar tool could induce differences in performance. Thus, the mere presence of a grip and a functional part in a tool might lead to less flexible grip choices, because habitually children's grasps tend to be directed at grips. Children handed over novel tools starting from two orientations (grip towards / away from participant). The three tools consisted of rods with either symmetrical (rod) or asymmetrical, compound (rod + appendage) shapes. The shape-to-function mapping was varied: either the rod-part represented the grip and the appendage represented the functional part, or vice versa. Additionally, children completed a Theory of Mind (ToM) scale. We expected that beginning state comfort would be higher for the symmetrical than asymmetrical tools. Furthermore, we expected ToM scores to be related to task performance. An ANOVA with tool (rod / rod+appendage1 / rod + appendage2) and orientation (grip towards / away) as within-subjects factors yielded significant effects of tool ( $p < .05$ ) and orientation ( $p < .001$ ). As predicted, beginning state comfort was highest when children acted with the symmetric tool. ToM scores were not

correlated with performance. Thus, tool structure seems to influence children's action planning in a social context.

**Keywords:** action planning, development, grasping, end-state comfort

**Presentation type:** Original Research Talk

## Poisson signal detection theory

Christian Kaernbach <sup>1\*</sup>, Malte Braack <sup>2</sup>

<sup>1</sup> *Institut für Psychologie, Christian-Albrechts-Universität zu Kiel*, <sup>2</sup> *Mathematisches Seminar, Christian-Albrechts-Universität zu Kiel*

Signal Detection Theory (SDT) is a widely-used framework for analyzing data from yes/no tasks, disentangling response bias from sensitivity. Traditional SDT assumes Gaussian distributions with equal variance for signal and noise. However, Gaussian SDT is incapable of modeling asymmetries often observed in receiver operating characteristic (ROC) curves stemming from experimental data. Poisson distributions are well-suited for modeling rare events like neuronal firing close to threshold. Poisson-based ROC curves naturally exhibit asymmetries akin to those observed in experimental findings. Despite its potential, Poisson SDT has been seldom proposed (e.g., Egan, 1975; Kaernbach, 1991) and, to the best of our knowledge, never been applied to experimental datasets. This may be attributed to the lack of tools for analyzing experimental data within the Poisson SDT framework. To address this, we offer a new method employing a maximum-likelihood approach to estimate the optimal parameters of a Poisson SDT model from experimental data. We discuss the challenges encountered in optimizing such models and the strategies employed to overcome them. The software package incorporates likelihood-ratio tests to assist users in determining the most appropriate model for their data. Through simulations, we evaluate various experimental designs to assess their capacity to distinguish between Gaussian and Poisson SDT. Our findings offer guidance for experimentalists aiming to investigate decision-making processes close to threshold. Egan, J. P. (1975). Signal detection theory and ROC analysis. New York: Academic Press. Kaernbach, C. (1991). Poisson signal detection theory: Link between threshold models and the Gaussian assumption. *Perception & Psychophysics* 50(5), 498-506.

**Keywords:** SDT, psychophysics

**Presentation type:** Original Research Talk

## Agency and Adaptation: How Human Engagement Shapes Goal-Directed Learning in AI Collaborations

Jakob Kaiser <sup>1\*</sup>, Maren Giersiepen <sup>2</sup>, Anja Huber <sup>3</sup>, Simone Schütz-Bosbach <sup>2</sup>

<sup>1</sup> Nuremberg Institute for Market Decisions, <sup>2</sup>Ludwig-Maximilians-University Munich, <sup>3</sup>University of Vienna

Humans increasingly interact with AI systems to solve important tasks. However, passively following AI advice may undermine our sense of agency and engagement with the environment. Theories of sense of agency suggest that diminished active involvement could impair our ability to learn effectively from our actions. To better understand the impact of human-AI interaction on learning, this study explores how AI interactions influence the processing of goal-relevant feedback. A total of 141 participants performed an online decision-making task alongside an AI avatar, which involved choosing stimuli that resulted in either monetary wins or losses. We manipulated both self-agency (whether the human or AI made the choice) and self-relevance (whether the human or AI received the outcome). Participants' reaction times in confirming trial outcomes served as an indicator of processing ease. We also measured participants' likelihood to repeat or change choices based on wins or losses during the task. We found that both self-agency and self-relevance led to significantly faster outcome processing. Crucially, self-agency compared to AI-agency resulted in more pronounced win-stay/lose-switch behavior, meaning that participants adapted their behavior more effectively based on performance feedback resulting from their own choices. This agency-dependent change in adaptivity occurred regardless of whether the human or the AI received the monetary outcome. These findings suggest that active decision-making, compared to passively following AI, fosters more efficient adaptation to feedback. Thus, our study demonstrates the importance of ensuring active human engagement in AI-supported task environments to facilitate effective learning.

**Keywords:** agency, self-determination, human-computer interaction, artificial intelligence, learning, feedback processing, adaptation

**Presentation type:** Original Research Talk



## **Predicting Perception of Scene Consistencies Using Graph Representations of Scene Grammar.**

Aylin Kallmayer <sup>1\*</sup>, Ronja Schnellen <sup>1</sup>, Melissa Vö <sup>1, 2</sup>

<sup>1</sup> *Goethe University Frankfurt, Department of Psychology, Germany*, <sup>2</sup>*Neuro-Cognitive Psychology, Department of Psychology, LMU Munich*

This study explores computational modeling of high-level scene understanding using graph-based representations to capture object identity (semantics: “what”) and their spatial relationships (syntax: “where”) in real-world scenes. Scene grammar – implicit rules that structure natural scenes – guides human understanding of both semantic (object-context) and syntactic (object-object) relationships in scenes. To model these relational structures, we employ graph autoencoders (GAEs) to learn scene embeddings, testing four experimental graph configurations: (1) a What graph (object identity), (2) a What and Where graph (object identity and spatial relations), (3) a Where graph (spatial relations only), and (4) a Control graph (object numerosity). Using these configurations, we tested whether simple assumptions about objects and spatial relations predict complex, human-like scene interpretations. We validated these embeddings using the SCEGRAM database, which systematically violates scene semantics and syntax. The first task assessed scene categorization, while the second predicted human consistency ratings. By comparing configurations against the numerosity baseline, we isolated the contributions of semantics and syntax. Results show that basic “what” and “where” features enhance model accuracy compared to the numerosity baseline, demonstrating that minimal representations can capture human-like scene consistency effects. Our findings suggest GAEs can model human scene understanding in an interpretable way. This work demonstrates the potential of graph-based approaches to study scene grammar representations and serve as a foundation for integrating graph-based representations with neural data to explore when, where, and how scene grammar aids efficient object and scene processing in the brain.

**Keywords:** computational models, scene grammar, scene perception

**Presentation type:** Original Research Talk

## Examining the mechanisms behind the animacy effect using event-related potentials

Siri-Maria Kamp <sup>1\*</sup>, Luisa Knopf <sup>1</sup>, Meike Kroneisen <sup>2</sup>, Edgar Erdfelder <sup>3</sup>

<sup>1</sup> *Universität Trier*, <sup>2</sup>*Rheinland-Pfälzisch Technische Universität Kaiserslautern-Landau*, <sup>3</sup>*Universität Mannheim*

Episodic memory performance is consistently higher for animate stimuli like humans or animals, than for inanimate objects. To examine the mechanisms underlying this “animacy effect”, we recorded event-related potentials (ERPs) while healthy, young adults encoded and subsequently freely recalled (exp 1) or recognized (exp 2) words referring to animate and inanimate objects. In both experiments, we replicated the animacy effect. Further, animates consistently elicited smaller N400-amplitudes than inanimates during encoding, suggesting that semantic access is facilitated for animate stimuli. No differences were found between stimulus types in any ERP markers thought to index elaborative encoding. In experiment 2, the word types did not differ in the early mid-frontal and the left parietal old/new effects, presumably indexing familiarity and bottom-up recollection, respectively. However, the late posterior negativity, presumably indexing effortful reconstruction of the study episode, was prominent for animates but absent for inanimates. Taken together, these results speak for a role of semantic processes during encoding, and effortful recollection during retrieval, in the animacy effect. Notably, these ERP patterns differ qualitatively from recently published results on the survival processing effect, supporting a dissociation of the mechanisms behind the two effects.

**Keywords:** episodic memory, animacy effect, event-related potentials

**Presentation type:** Original Research Talk

## Incidental Disgust vs. Fear: How Emotions Shape Recognition Accuracy and Underlying Retrieval Dynamics

Elif Yüvrük <sup>1</sup>, İlayda Öney <sup>2</sup>, Aycan Kapucu <sup>2\*</sup>

<sup>1</sup> *Department of Psychology, Mugla Sıtkı Kocman University, Mugla/Turkey*, <sup>2</sup>*Department of Psychology, Ege University, Izmir/Turkey*

Disgust-related items have a significant advantage over fear-related items regarding recognition memory accuracy (e.g., Moeck et al., 2021). Disgust-related items also influence the retrieval dynamics underlying recognition decisions. That is, participants exhibit an increased liberal

response bias towards making "Old" decisions, regardless of accuracy advantage, and efficiently retrieve familiarity information favoring the "Old" decisions for disgust-related items (Yüvrük & Kapucu, 2023). Yet, the replicability of disgust's advantage remains unexplored when disgust is not integral (i.e., stimulus's inherent emotional quality) but incidental (i.e., participant's mood) to test items. In the present study, we aimed to investigate how incidental disgust influences recognition memory decisions for neutral items using the diffusion model of recognition memory (Ratcliff, 1978). Following studying the list of neutral words, participants were induced into disgust, fear, or neutral emotions, and then they completed an old/new recognition memory test. Thus, we investigated the effects of specific emotions mostly on the retrieval stage of memory, not on encoding. Although manipulation check analyses confirmed that target emotions were induced intensely and discretely in participants, preliminary results showed no incidental disgust-related advantage on the accuracy, unlike integral disgust, questioning the replicability of disgust-related advantage. Ongoing diffusion model analyses are testing the retrieval dynamics of these surprising accuracy results, controlling for speed-accuracy tradeoffs, which have the potential to uncover the underlying decision process.

**Keywords:** incidental disgust and fear, recognition memory, diffusion model

**Presentation type:** Original Research Talk

## The Role of Skin Mechanics for Softness Exploration and Perception

Didem Katircilar <sup>1\*</sup>, Roland Bennewitz <sup>2</sup>, Knut Drewing <sup>1</sup>

<sup>1</sup> HapLab, Experimental Psychology Department, Justus Liebig University, Giessen, Germany,

<sup>2</sup>INM Leibniz-Institute for New Materials, Saarbrücken, Germany

People explore objects through various exploratory procedures to assess their properties, such as stroking a texture or pressing a soft object. They can also adjust specific parameters of their strategies, like applying more force to enhance precision (Kaim & Drewing, 2011). Individuals with finger pads that are more elastic and hydrated, or smaller in size, tend to show better precision in passive touch tasks (Deflorio et al., 2023). In the present study, we investigate whether these individual differences lead to different exploratory strategies (here: force-tuning) and whether they affect tactile precision in active softness perception. Participants completed two softness tasks in two sessions. In one session, hyaluronic acid was applied to their finger pad, while no treatment was given in the other. At the beginning and end of each session, elasticity and hydration were measured using cutometer and corneometer devices, and finger pad size was assessed with a caliper in three dimensions. We presented pairs of stimuli (Young's Modulus: 41.5 vs. 45.0; 28.7 vs. 31.3 kPa) and participants chose the softer stimulus. In the unconstrained condition, participants

could apply as much force as they wanted, while in the restricted condition, force was limited to 2N. Core findings were that hyaluronic acid increased elasticity and hydration, participants starting with hyaluronic acid used less force in the unconstrained condition (indicating slow initial force-tuning), and higher individual hydration and force levels together led to more accurate performance in both softness tasks. Overall, the results demonstrate tuning of exploration to skin mechanics.

**Keywords:** skin mechanics, haptic exploration, softness perception

**Presentation type:** Original Research Talk

## **Is auditory scene analysis affected by a central processing bottleneck?**

Florian Kattner \*

*Health and Medical University Potsdam*

It is well known that visual attention is limited in capacity, indicated by increasing visual search time with larger set sizes. However, previous studies have shown that visual search can be executed in parallel to central response selection, indicating that it is not subject to a central processing bottleneck. There is also evidence of limited capacity in auditory attention with longer response times and higher error rates for target sounds in more complex auditory scenes. The present study uses a dual-task paradigm to investigate whether attentional search of an auditory scene depends on central capacity limitations required for response selection. Therefore, participants were presented with a varying number of brief environmental sounds (1-6 animal sounds) including one of two possible target sounds (e.g., moo or neigh) and asked to report the target animal (task 2). The auditory scene was presented at varying stimulus onset asynchronies (SOA; 50-800 ms) after a visual target stimulus (task 1). Reliable set size effects were observed in response times and error rates of the auditory search task. Moreover, auditory search time was longer at short SOAs, indicating a central processing bottleneck due to the response selection for task 1. However, the auditory set size effect was not reduced at short SOAs, indicating that auditory scene analysis may depend on the capacity limitations of central attention – possibly depending on the complexity of the response selection process. Taken together, the results suggest that auditory attention may be more dependent on central processing limitations than visual attention.

**Keywords:** Auditory Attention, Auditory Search, Dual-Task, Central Bottleneck, Auditory Scene Analysis

**Presentation type:** Original Research Talk

## Representational Gradients of Emotion-relevant Musical Information in the Human Cerebral Cortex

Seung-Goo Kim <sup>1\*</sup>, Tobias Overath <sup>2</sup>, Daniela Sammler <sup>1</sup>

<sup>1</sup> *Research Group Neurocognition of Music and Language, Max Planck Institute for Empirical Aesthetics*, <sup>2</sup> *Department of Psychology and Neuroscience, Duke University*

Music often evokes strong emotions. Yet, how musical auditory representations are abstracted in the brain and how these different representations contribute to the emergence of felt emotions remains poorly understood. Recent work suggests that pre-trained audio convolutional neural networks (CNNs) can capture information in real-world music that is relevant to felt emotions and neural activity in the medial prefrontal cortex (Kim et al., 2023). Here, we explored (i) whether increasingly abstract representations of music in different layers of the CNN are encoded along a well-established functional gradient—from unimodal sensory to transmodal associative regions (Margulies et al., 2016), and (ii) how layer-specific CNN embeddings predict human behavioral ratings of musical emotions.

We analyzed the fMRI dataset of Sachs et al. (2020) where 37 participants listened to one ‘happy’ and two ‘sad’ instrumental musical pieces. We found a marked correspondence between the CNN layer-specific representational gradient of musical information and the gradient of the intrinsic functional connectivity of the cortex (Margulies et al., 2016) suggesting that the transformation of the auditory signal along the cortical hierarchy may involve an abstraction mechanism similar to what the CNN implements, beyond the auditory systems (cf. Giordano et al., 2023). We also found distinct encoding patterns of the ‘Emotionality’ and ‘Enjoyment’ ratings across CNN layers suggesting that basic and aesthetic emotional experiences may depend on different abstraction levels of the audio signal represented along the cortical gradient. Overall, the current analyses may open new ways to better understand the multi-layered mechanisms underlying musical emotions (Juslin, 2013).

**Keywords:** Computational Neuroscience, Emotions, Functional MRI, Music, Machine Learning, Modeling, Perception

**Presentation type:** Original Research Talk

## Investigating Age Effects on Face Recognition: Using the Face Adaptation Paradigm for Contrast Information

Nils Kloeckner <sup>1, 2, 3\*</sup>, Ronja Mueller <sup>1, 3, 4</sup>, Claus-Christian Carbon <sup>2, 5, 6</sup>, Tilo Strobach <sup>1, 3</sup>

<sup>1</sup> *Department of Psychology, Medical School Hamburg, Hamburg, Germany,*

<sup>2</sup> *Bamberg Graduate School of Affective and Cognitive Sciences (BaGrACS), University of Bamberg, Bamberg, Germany,* <sup>3</sup>*ICAN Institute for Cognitive and Affective Neuroscience, MSH Medical School Hamburg, Hamburg, Germany,* <sup>4</sup>*IFPM Institute for Forensic Psychology and Forensic Medicine, MSH Medical School Hamburg, Hamburg, Germany,* <sup>5</sup> *Department of General Psychology and Methodology, University of Bamberg, Bamberg, Germany,*

<sup>6</sup> *Research Group EPÆG (Ergonomics, Psychological Aesthetics, Gestalt), Bamberg, Germany*

The ability to recognize human faces is impaired in older adults (OAs) compared with younger adults (YAs). The former age group's diminished capacity to integrate new facial information could be one reason for this impairment. The face adaptation paradigm is one efficient tool to investigate this information integration ability and the plasticity of our perceptual and memory system. Adaptation effects have been observed for many dimensions of faces. In a recent study, we induced face adaptation effects for non-configural brightness information in OAs and YAs. Results indicated that these adaptation effects occur similarly across age groups, demonstrating that adaptation effects for facial brightness information are age-independent. However, this prior research is limited to only one type of information, determining the conclusions about age-related face adaptation effects and face recognition differences. Therefore, the present online-study for the first time investigated possible age effects in face adaptation for facial contrast. We show that exposure to an image of a familiar face with strongly manipulated facial contrast (increased or decreased) alters the perception of subsequent face stimuli: original face images appear then to be manipulated, while images similar to the adaptor are perceived as non-manipulated originals. However, just as for brightness, we were unable to find differences in the adaptation effect between OAs and YAs for facial contrast. We discuss the results in the context of age-related difficulties in face recognition.

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

**Presentation type:** Original Research Talk

## **AI-augmented decision-making in one-to-one face matching: Alternatives to concurrent advice presentation to reduce overreliance**

Eesha Kokje <sup>1\*</sup>, Eva Lerner <sup>1, 2</sup>, Susanne Gaube <sup>3</sup>

<sup>1</sup> *Department of Psychology, LMU Munich, Munich, Germany*, <sup>2</sup>*Department of Business Psychology, Technical University of Applied Sciences, Augsburg, Germany*, <sup>3</sup>*UCL Global Business School for Health, University College London, London, UK*

The use of AI-based decision aids has seen a steady rise in recent years in areas like border control, police investigations, or identity verification. Previous studies from different fields report users' overreliance on incorrect AI advice as a major issue in the effective integration of AI systems, as it leads to underperformance of the human-AI team compared to AI alone. Although explainability has been proposed as a solution, results so far have been mixed. We aimed to find potential solutions beyond explainability, by exploring the impact of delayed advice presentation, which may reduce anchoring bias caused by seeing advice before having the opportunity to engage cognitively with the decision. We conducted two experiments, in which we tested (a) on-demand advice/explanations and (b) conditional advice i.e. advice after user makes initial decision and only if that decision is incongruent with the AI recommendation. We found that participants' overall performance did not differ significantly whether advice/explanation was demanded or presented by default. However, participants tended to agree with AI advice more when they demanded it and tended to disagree with the advice more when they demanded explanations. In Experiment 2, for the first time, the human-AI team performed better than the AI alone in the conditional advice condition, and participants agreed with AI advice less often in this condition. Additionally, participants were more confident in their decision when they rejected incorrect advice. These findings contribute towards potential solutions for reducing overreliance on AI in order to improve performance of the human-AI team.

**Keywords:** artificial intelligence, human-AI interaction, face identification, AI advice, overreliance, human-AI teaming

**Presentation type:** Original Research Talk

## Exploring the neural basis of individual gaze in complex scenes

Diana Kollenda <sup>1, 2\*</sup>, Elaheh Akbarifathkouhi <sup>1</sup>, Maximilian Broda <sup>1, 2</sup>, Benjamin de Haas <sup>1, 2</sup>

<sup>1</sup> *Experimental Psychology, Justus Liebig University, Giessen, Germany,*

<sup>2</sup> *Center for Mind, Brain and Behavior (CMBB), Marburg and Giessen, Germany*

Recent research has demonstrated systematic individual differences in gaze patterns during free viewing of complex scenes, especially in fixating faces and text. What is the neural basis of these individual biases? Developmental studies in humans and non-human primates suggest ties between category-specific salience and neural preferences in the ventral stream. We conducted a two-part study: an eye-tracking session where participants freely viewed 700 complex scenes, followed by an fMRI session using a standard localizer paradigm to identify object-category-specific activity (e.g., faces, text) in the inferior temporal cortex (IT). Our participants ( $n = 26$ ; target = 60) showed reliable differences in fixation biases towards faces and text. We also observed substantial individual differences in the distinctiveness of corresponding patterns of IT activity, a measure that has recently been associated with the development of category-specific neural preferences. Notably, we found first evidence suggestive of a link between the immediate attraction of gaze towards faces and text during free-viewing and the distinctiveness of corresponding IT-patterns in the fMRI session (text:  $r = .41$ ,  $p = .04$ ; faces:  $r = .37$ ,  $p = .07$ ). This preliminary result suggests that people with a stronger tendency to fixate faces or text also have a more distinct representation of the corresponding stimulus category in the ventral stream. Furthermore, we plan to test a potential relationship between spatial individual saccadic biases and corresponding anisotropies in early visual field maps. Taken together, we hope to learn how individual brains shape individual gaze and, ultimately, our perception of the world.

**Keywords:** individual differences, eye movements, neuroimaging, fMRI, behavior, complex scenes

**Presentation type:** Original Research Talk

## Change Blindness and Anticipation in Naturalistic Driving: The Role of Visuospatial and Temporal Complexity

Vasiliki Kondyli <sup>1\*</sup>, Mehul Bhatt <sup>2</sup>

<sup>1</sup> *Department of Psychology, Lund University, Sweden,*

<sup>2</sup> *Department of Computer Science, Örebro University, Sweden*

Everyday driving relies on cognitive functions such as visual search, change detection and predictive attention for maintaining a high-level mental model of the world. Such functions are



especially constrained by limited cognitive resources under complex conditions. Understanding the manner in which environmental complexity influences cognitive driving performance is key to improving road safety and developing human-factors guided driver assistance systems. Towards this, we explore the relationship between visuospatial and temporal complexity, and drivers' situational awareness and decision-making.

Particularly, we address two research questions: (I) How environmental complexity (visuospatial and temporal) impacts (in)attentional blindness; and (II) How does visual cueing impact anticipatory attention. In a naturalistic VR study, 150 participants drove in an immersive urban environment with varying complexity levels while responding to conditions such as overtaking, pedestrian crossings, occlusions, safety-criticality. The experiment, rooted to real-world driving data, incorporates a systematic cognitive model of environmental complexity consisting of dynamic visual, spatial, multimodal interaction features. Furthermore, we also analyse multimodal behavioural data, including gaze patterns, head movements, steering and braking.

Results show that: (1) High visuospatial complexity increases inattentional blindness, with drivers compensating by prioritizing critical events; (2) Temporal complexity impairs detection performance, especially when events occur in rapid succession (1 sec) or when they last 5-10 seconds; and (3) Visual cueing improves anticipation, detection performance, and reaction time. These findings highlight the importance of adaptive strategies in overcoming cognitive limitations, providing insights for designing safety systems and training protocols for improving or assessing driver performance in everyday driving environments.

**Keywords:** change blindness, visual search, anticipation, environmental complexity, attentional strategies, naturalistic observation, driver education

**Presentation type:** Original Research Talk

## **Time perception and endogenous spatial attention: Differential effects of shifts towards vs. away from stimuli**

Alina Krug \*, Anke Huckauf

*General Psychology, Ulm University*

Previous research has shown that increasing eccentricity shortens the perceived duration of brief stimuli. However, shifts of endogenous spatial attention can prolong perceived duration. Aim of the present study is to investigate whether endogenous attention prolongs perceived duration for stimuli present at different eccentricities. In a temporal bisection task, participants judged whether a peripheral probe with varying duration (20-220 ms) presented at 3 or 9 degrees of visual angle (dva)

is more similar to a short or long previously learned anchor stimulus. In Experiment 1, the probe was preceded by a valid (100%) or neutral central arrow cue. In Experiment 2, the probe was preceded by a valid or invalid central arrow cue; cue validity was set to 75%. An eye-tracker monitored saccadic eye movements on-line. Replicating previous research, perceived duration was shorter for stimuli presented at 9 compared to 3 dva in both experiments. However, there was no effect of cue on perceived duration in Experiment 1. In Experiment 2, perceived duration was shorter for the invalid compared to the valid cue, yet there was no interaction between eccentricity and cue. This indicates that shifting attention away from the peripheral probe shortened perceived duration rather than shifting attention towards it prolonging it. The results are discussed with regard to attentional disengagement and reorienting as well as differential temporal processing mechanisms and potential underlying neurophysiological mechanisms.

**Keywords:** Time perception, Duration estimation, Peripheral vision, Eccentricity, Visual spatial attention, Endogenous attention, Endogenous cueing

**Presentation type:** Original Research Talk

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

Tobias Kühlwein <sup>1\*</sup>, Chhavi Sachdeva <sup>1</sup>, Jan Rummel <sup>2</sup>, Nicolas Rothen <sup>1</sup>

<sup>1</sup> *UniDistance Suisse*, <sup>2</sup>*Universität Heidelberg*

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

baseline and a prospective memory block. Preliminary results showed reduced precision in color recall in prospective memory blocks in comparison to baseline blocks. The difference in color recall between prospective memory block and baseline block increased with increasing working memory loads. In line with previous research, we conclude that working memory and prospective memory share common cognitive processes.

**Keywords:** prospective memory, memory, working memory, color, cognition

**Presentation type:** Original Research Talk

## **Singing as social interaction: interpersonal coupling and singing quality**

Elke Lange \*, Anton Schreiber , Melanie Wald-Fuhrmann , Klaus Frierer

*Max Planck Institute for Empirical Aesthetics*

Recent decades have seen a growing body of hyperscanning studies, investigating neural and physiological synchronization during social interactions. Interpersonal coupling has been related to action coordination and emotional states, including empathy and feelings of connectedness. Several of these studies focused on choirs, showing that singing enhances brain synchronization and coupling of physiological processes. In our study, we investigated the artistic consequences of physiological coupling on singing performance. Based on existing literature, we hypothesized that coupling would improve singing quality, specifically through enhanced inter-personal pitch agreement and timing precision. In an earlier study, we asked eight professional singers to repeatedly perform polyphonic Renaissance music in three spatial arrangements (distant, close, close with physical contact). We showed that physical contact increased coupling of the respiration signals (Lange et al., 2022; DOI: 10.3389/fnhum.2022.928563). We now analyzed the audio recordings and related singing quality in terms of pitch accuracy and timing to the respiration coupling index. Recordings added up to 672 audio files, from which we annotated a total of 64.215 tone events with fundamental frequency measurements and exact tone onsets using computer tools. However, physical contact did not improve pitch accuracy or timing in comparison to singing without contact. Including the data from all spatial arrangements in linear mixed effects models, respiration coupling did not predict singing quality. Results do not correspond to our initial expectations. We conclude that coupling of the respiration signals between professional singers does not influence the artistic quality of their performance – at least not in our setting.

**Keywords:** Physiological coupling, hyperscanning, singing performance

**Presentation type:** Original Research Talk

## Spotting the Difference from Lab to Screen. Male Cheating Behavior Increases in Online versus In-Person Environments

Kai Leisge \*, Anna Heggenberger , Christian Kaczmarek , Werner Pitsch , Sabine Schaefer

*Institute of Sport Sciences, Saarland University, Saarbrücken, Germany*

In two studies we investigate gender differences of cheating in online versus in-person environments. Theory suggests online anonymity increases social distance and therefore results in higher cheating (Chatness et al., 2007). Cheating also increases over time (Garrett et al., 2016), but previous findings concerning gender differences are inconsistent (Gerlach et al., 2019). **Study one:** 137 participants (online: n=75, in-person: n=62; balanced gender distribution) completed a fine-motor tracing task in four sessions. Individuals made a performance prediction before each trial prior to competing against each other for the highest scores. Not achieving the predicted score resulted in a loss of all points for this trial. Cheating was measured as the difference between self-reported and expert-rated errors. Findings suggest greater cheating for men as compared to women in the online condition, when cheating prevented them from losing their points. In addition, cheating increased over time in the online condition, especially in men. **Study two:** 144 participants (online: n=71, in-person: n=63; balanced gender distribution) completed the “Difference Spotting Task”, a cognitive measure to assess cheating at the individual level (Liu et al., 2021). Cheating was measured by the number of unsolvable items a participant claims to have solved. Findings show higher cheating for men as compared to women in the online condition. This suggests that online contexts may reduce certain internal and social checks on dishonesty, such as concerns about self-image or accountability, potentially allowing some individuals to engage in cheating with fewer perceived consequences compared to in-person settings.

**Keywords:** Dishonesty, Lying, Cheating, Social Distance, Anonymity, Online and In-Person

**Presentation type:** Original Research Talk

## How Does the Brain Sustain Visual Experiences? Insights from Neural and Behavioral Studies

Alex Lepauvre <sup>1, 2\*</sup>, Micha Engeser <sup>1, 3</sup>, Consortium Cogitate <sup>1</sup>, Stanislas Dehaene <sup>4, 5</sup>, Lucia Melloni

<sup>1, 6, 7, 8</sup>

<sup>1</sup> *Neural Circuits, Consciousness and Cognition Research Group, Max Planck Institute of Empirical Aesthetics, Frankfurt am Main, Germany*, <sup>2</sup>*Donders Institute for Brain, Cognition and Behaviour, Radboud University Nijmegen, Nijmegen, 6500 HB, the Netherlands*, <sup>3</sup> *Department of Mathematics*

*and Computer Science, Physics, Geography, Justus-Liebig-Universität Gießen, Germany,*

*<sup>4</sup>Cognitive Neuroimaging Unit, NeuroSpin center, Université Paris-Saclay, Commissariat à l'Energie*

*Atomique (CEA), Institut National de la Santé et de la Recherche Médicale (INSERM), Gif-sur-Yvette, 91191, France, <sup>5</sup> Collège de France, Université Paris-Sciences-Lettres (PSL), Paris, 75005,*

*France, <sup>6</sup> Department of Neurology, NYU Grossman School of Medicine, New York, USA,*

*<sup>7</sup> Canadian Institute for Advanced Research (CIFAR), Brain, Mind, and Consciousness Program,*

*Toronto, ON, Canada, <sup>8</sup> Predictive Brain Department, University Alliance Ruhr, Faculty of Psychology, Ruhr-Universität Bochum, Germany*

A central question in psychology and neuroscience is how the brain generates and sustains our conscious experiences. While much research has focused on how stimuli enter awareness, less is known about how these experiences persist and whether they remain tightly linked to sensory input. We addressed this question in two studies exploring the neural and behavioral dynamics of sustained visual stimuli. In the first study, we presented visual stimuli of varying duration (0.5, 1.0, and 1.5 seconds) while recording brain activity using intracranial EEG. We found that sensory regions in the posterior cortex reflected the duration of the stimuli, while prefrontal cortex (PFC) activity occurred only briefly at the start of each stimulus. Under the assumption that participants' experience aligns with stimulus dynamics, these results challenge theories assuming that the PFC plays a central role in conscious experience, such as the global workspace theory (GNWT). However, our second study adds nuance to this interpretation. Using the psychological refractory period (PRP) as a time-resolved measure of conscious engagement, we found that the PRP effect was independent of stimulus duration and did not consistently coincide with stimulus offset. This suggests that conscious processing is not always tightly coupled to sensory input dynamics. Combined, these findings indicate that conscious processing may become decoupled from sensory input, even under simple conditions. This offers fresh insights into the complex relationship between sensory input, cognition, and conscious experience, with important implications for theories of consciousness.

**Keywords:** Consciousness, Adversarial collaboration, iEEG, behaviour, Visual perception

**Presentation type:** Original Research Talk

## Unmasking Bias: Brightness Priming in the Weapon Identification Task

Veronika Lerche <sup>1\*</sup>, Jennifer Kubota <sup>2</sup>, Andreas Voss <sup>3</sup>

<sup>1</sup> Kiel University, <sup>2</sup> University of Delaware, <sup>3</sup> Heidelberg University

The Weapon Identification Task (WIT; Payne, 2001) is a widely used tool for examining racial stereotypes. In this task, a prime  $\times$  target interaction effect typically emerges: Participants misclassify tools as weapons more often when preceded by Black faces compared to White faces, and vice versa for weapons. This interaction has often been attributed to associations between Black individuals and danger or crime. However, our analysis revealed that the weapons used in previous studies were darker than the tools. To investigate whether brightness priming contributes to the prime  $\times$  target interaction effect in the WIT, we conducted a series of studies. First, we demonstrated that brightness priming exists within the priming procedures and materials of the WIT. In three additional studies, we kept target brightness constant across conditions. Notably, when target brightness was kept constant, we observed either no interaction effect or a weaker effect compared to conditions using Payne's original materials. These findings suggest that the interaction effect typically observed in WIT studies may be at least partially attributable to brightness priming rather than solely to racial stereotypes. This research underscores the importance of considering perceptual features like brightness in studies of racial stereotypes.

**Keywords:** stereotypes, weapon task, priming

**Presentation type:** Original Research Talk

## Beyond Noise: Exploring Guessing Through the $\alpha$ -Parameter in the Lévy-Flight Model

Julia V. Liss <sup>1\*</sup>, Katharina Mminele <sup>2</sup>, Max Brede <sup>2</sup>, Veronika Lerche <sup>2</sup>

<sup>1</sup> University of Mannheim, <sup>2</sup> Kiel University

The Lévy-flight model extends the diffusion model by introducing the  $\alpha$ -parameter, which shapes the noise distribution in evidence accumulation during binary decision-making. Lower  $\alpha$ -values correspond to heavier-tailed noise distributions, allowing for sudden, large changes or “jumps” at any stage of the accumulation process. Although it has been shown that  $\alpha$  can enable more accurate data fits, its psychological interpretation remains underexplored. This study investigates whether  $\alpha$  captures guessing behavior, particularly sophisticated guessing. Sophisticated guessing is based on partial information and thus involves some accumulation of evidence. We hypothesize that lower  $\alpha$ -values, and therefore more frequent jumps, are associated with increased guessing.

Across multiple studies, we encouraged or discouraged guessing through instructions. Study 1 employed a brightness discrimination task in which  $\alpha$ -values did not significantly differ between conditions. This unexpected result might be due to high stimulus ambiguity driving consistent guessing across both conditions. To address this, Study 2 employed a numerical mean-value computation task that allowed participants to achieve varying levels of confidence by considering either full or partial information. Here, participants exhibited lower  $\alpha$ -values when instructed to make educated guesses, supporting the interpretation of  $\alpha$  as an indicator of sophisticated guessing. These findings provide preliminary evidence that  $\alpha$  may serve as a tool for detecting guessing behavior, with practical applications, such as the exclusion of inattentive participants.

**Keywords:** Lévy-flight model, diffusion model, decision making, guessing, uncertainty

**Presentation type:** Original Research Talk

## Canonical phenomena in naturalistic avoidance learning – second-order conditioning, overshadowing, and partial reinforcement

Huaiyu Liu <sup>1\*</sup>, Federico Mancinelli <sup>2</sup>, Tom Beckers <sup>3</sup>, Josie Linnell <sup>1</sup>, Dominik Bach <sup>1, 2</sup>

<sup>1</sup> UCL Queen Square Institute of Neurology, Department of Imaging Neuroscience, University College London, United Kingdom, <sup>2</sup> University of Bonn, Transdisciplinary Research Area “Life and Health”, Hertz Chair for Artificial Intelligence and Neuroscience, Germany, <sup>3</sup> Centre for the Psychology of Learning and Experimental Psychopathology, Faculty of Psychology and Educational Sciences, KU Leuven, Belgium

Learning to predict and avoid threat is fundamental for survival. One key behavior is avoidance — learning to perform certain actions to prevent impending aversive outcomes, prior to their occurrence. Maladaptive avoidance is a crucial feature of anxiety and trauma-related disorders. Hence, unraveling the mechanisms of avoidance learning might have real-world implications. While the boundary conditions of classical (Pavlovian) conditioning in humans are well-known, avoidance learning relies on distinct neurobiological mechanisms and potentially follows different rules. Previous work has largely relied on tasks employing a small number of unnatural actions. Here, we set out to establish boundary conditions of avoidance learning in a naturalistic task. We sought to confirm or reject canonical learning phenomena known from classical aversive conditioning, focusing on second-order conditioning, overshadowing, and partial reinforcement. In three experiments (N = 100 each), we used a virtual reality platform (CogLearn toolkit for Unity) with three-dimensional coloured objects as conditioned stimuli (CS) and an uncomfortable sound as



unconditioned stimulus (US), allowing for unconstrained and uninstructed avoidance actions. Our primary outcome was the mean distance from the CS during the CS presentation (i.e. before the US). We found strong evidence for second-order-conditioning (larger avoidance responses for second-order CS+ compared to second-order CS-), overshadowing (cue-competition in a compound stimuli), partial-reinforcement-acquisition-effect (slower avoidance learning for partially CS+ compared to fully reinforced CS+), and partial-reinforcement-extinction-effect (slower extinction for partially reinforced CS+ compared to fully reinforced CS+). Our findings identified four canonical learning phenomena that are diagnostic for building cognitive-computational models of avoidance learning.

**Keywords:** Human avoidance learning; Boundary conditions; Canonical phenomena; Virtual reality; Naturalistic experimental settings; Cognitive-computational modeling

**Presentation type:** Original Research Talk

## Face processing in congenital prosopagnosia measured by binocular rivalry

Karin Ludwig \*, Theresa Halder , Thomas Schenk

*Klinische Neuropsychologie, Department Psychologie, Ludwig-Maximilians-Universität München*

People with congenital prosopagnosia (CP) have difficulties recognizing familiar individuals, for example, acquaintances or celebrities, by their face alone, which has been assumed to be due to disruptions of holistic face processing. Showing a face stimulus in an upright position enables holistic face processing, whereas showing it inverted makes observers rely on individual features. One would assume that upright faces are thus more salient for observers with intact holistic face processing than inverted faces and that this difference is much smaller in CP.

Binocular rivalry (BR) can be used to measure the saliency of visual stimuli since salient stimuli tend to be more perceptually dominant. Thus, we used BR to implicitly measure the relative saliency of upright vs. inverted faces for observers with and without CP (N per group = 21).

In Exp. 1, we further tested whether the processing of facial emotions was intact in CP by using faces displaying different emotions (fearful, happy, neutral), which was the case. In Exp. 2, we tested whether introducing the Thatcher effect (inverted eyes and mouth are strongly noticed in an upright but not in an inverted face by people with intact face processing) could further differentiate between observers with and without CP. This latter hypothesis was not confirmed, but we could



show in both experiments that faces were more dominant and the face inversion effect more pronounced in the control group than in the CP group.

BR can thus serve as a sensitive tool to detect processing differences between groups.

**Keywords:** prosopagnosia, binocular rivalry, face perception, higher-level visual processing, bistable perception

**Presentation type:** Original Research Talk

## **Pre-decisional information search adaptation through planning and finetuning**

Linda McCaughey <sup>1\*</sup>, Johannes Ziegler <sup>1</sup>, Klaus Fiedler <sup>2</sup>

<sup>1</sup> *Ludwig-Maximilians-Universität München*, <sup>2</sup> *Heidelberg University*

When searching for information before making a decision one faces a fundamental trade-off. On the one hand, more information will almost always improve the decision outcome. On the other hand, spending more time, money, or effort on further information search may be more costly than that improvement is beneficial. If decision makers are adaptive, they should use their resources in information search efficiently. Using a sampling-based decision paradigm with financial costs for each observation, we conducted three main experiments to investigate whether and how participants adapt their information amount to a relevant aspect of the environment when it is announced. Experiment 1a (N = 78) and b (N = 84) focussed on adaptation to different ratios of information cost and rewards, revealing that participants are capable of adapting, but seem to do so mainly based on planning. Experiment 2 (N = 147) assessed the role of a second, fine-tuning process by varying whether participants received feedback or not. Surprisingly, this did not make a difference. Experiment 4a (N = 176) and b (N = 318) implemented different feedback types with more trials, and a different cost-payoff ratio each. This did reveal adaptation through a finetuning process over time, which was, however, still not influenced by feedback. This supports planning and finetuning as meaningful categories of adaptation, offering a framework for further investigating adaptation processes and what might hinder as well as facilitate and assist them.

**Keywords:** judgement and decision making, information search, adaptive decision making, sample-based decisions, decisions from experience, metacognition; learning

**Presentation type:** Original Research Talk

## **Cooperation in motion: How action dynamics inform cooperative decision-making**

Luke McEllin <sup>1\*</sup>, Susann Fiedler <sup>2</sup>, Natalie Sebanz <sup>1</sup>

<sup>1</sup> *Central European University*, <sup>2</sup> *WU Vienna*

Prudently choosing who to interact with and who to avoid is an important ability to ensure that we benefit from a cooperative interaction. While the role of others' preferences, attributes, and values in partner choice have been established, much less is known about whether the manner in which a potential partner plans and implements a decision provides helpful cues for partner choice. We used a partner choice paradigm in which participants chose who to interact with in the Prisoners' Dilemma. Before choosing a cooperation partner, participants were presented with information about the potential partners' decision-related actions in another round of the Prisoners' Dilemma. They received either information about the potential partners' planning during decision making (i.e., decision-time; Experiment 1) or action execution during decision implementation (i.e., movement directness; Experiment 2). Across both games, participants preferred to interact with those who planned actions quickly or executed actions with direct and smooth movements, indicating that they were cooperating confidently and without deliberation. In a separate study, we show that synchrony in a public goods game raises expectations of cooperation. This demonstrates that action cues present in either the planning or implementation of economic decisions influence partner choice. We discuss implications of this finding for human decision-making and perception-action coupling in action understanding.

**Keywords:** Cooperation; Action Understanding; Decision-making; Person Perception

**Presentation type:** Original Research Talk

## **Try Harder! The Influence of Effort Instructions on Cognitive Flexibility**

Jonathan Mendl <sup>\*</sup>, Gesine Dreisbach

*University of Regensburg*

In everyday life, we often have to show flexible behavior and switch between various tasks. Previous studies suggest that switching tasks is effortful and tends to be avoided. Therefore, the present study investigated whether and how explicit effort instructions would influence cognitive flexibility. In two experiments, we used a hybrid task-switching paradigm with a mixture of predetermined (forced-choice) and voluntary (free-choice) trials. Before every trial, participants

received a cue that instructed participants to either invest high or no special effort. Voluntary switch rates (VSR) on free-choice trials and RTs and error rates on forced-choice trials served as dependent measures. Under the assumption of a bidirectional association between effort and cognitive flexibility during task switching, we expected increased flexibility following high-effort cues. In Experiment 1, using pictograms as cues, we observed no significant influence of the effort cue on flexibility (VSR or switch costs). In Experiments 2 and 3, using explicit words as effort cues, we found an increased VSR following high-effort cues. The results are discussed in terms of associative and motivational influences on cognitive flexibility.

**Keywords:** Cognitive Control, Cognitive Flexibility, Cognitive Effort, Task Switching

**Presentation type:** Original Research Talk

## **Binding and Retrieval of Event Files: Insights from error types in an S1R1-S2R2 task**

Malte Möller \*, Anna Render , Susanne Mayr

*University of Passau*

Encountering stimuli and responses is thought to create transient episodic links between stimulus- and response-related features, referred to as event files. Reencountering any feature of an event file is assumed to retrieve the whole event file, leading to impaired performance whenever the retrieved information does not match current processing requirements as compared with full or no repetitions (partial repetition costs, PRCs). The current study (N = 34) further investigated this notion by additionally analyzing error types in a variant of the S1R1-S2R2 task. In a typical task, participants first perform a cued response (R1) after the onset of a stimulus (S1), followed by a binary-choice response (R2) determined by a specific feature of a subsequent stimulus (S2). However, with two response alternatives, errors in R2 cannot be unambiguously attributed to the retrieval of the event file created of the S1-R1 episode. In the present task, shape (circle, triangle, or square) and location (above or below) were systematically repeated or changed between S1 and S2. Responses (i.e., “left”, “center”, or “right”) either repeated or changed between R1 and R2. Results revealed significant PRCs in latency and overall accuracy for shape only. Importantly, repeating the shape between S1 and S2, but changing the required response, increased the likelihood of repeating R1 at the time of S2. Moreover, the results suggest that repeating the required response between R1 and R2 retrieves the S1 shape. Together, the results support the notion that stimulus-response information contained in an event file is retrieved upon feature repetition.

**Keywords:** action control, binding, retrieval, memory

**Presentation type:** Original Research Talk

## **Actions in Context: The Interrelation Between Scene Functions, Actions and Object Phrases**

Lea Müller Karoza <sup>1\*</sup>, Melissa Vö <sup>1, 2</sup>

<sup>1</sup> *Goethe University Frankfurt, Department of Psychology, Scene Grammar Lab, Germany,* <sup>2</sup>*Neuro-Cognitive Psychology, Department of Psychology, LMU Munich*

Most actions occur in interaction with our environment, where scenes and objects provide cues for action possibilities. While scenes are best categorized by actions, completing actions usually requires objects. The scene grammar framework suggests that objects are grouped into "phrases," potentially reflecting functional organization. However, whether phrases are relevant for understanding actions remains largely unexplored. This study examines how objects and scene context influence action identification and scene-action fit assessment.

Across three experiments, participants viewed scenes, named actions, and identified necessary objects. Those used for the same actions were spatially closer than objects used for different actions, supporting the notion of functionally organized phrases. Sparse scenes lead to object-level actions (e.g., opening windows) while richer scenes evoked higher-level action schemata involving multiple objects. Priming participants solely lexically elicited specific, higher-level actions predominantly (e.g., cooking with utensils and ingredients). Thus, the richness of our surroundings influences how we conceptualize actions; our scene concepts prioritize functions, whereas visual prompts shift the focus towards lower-level actions.

In an independent eye-tracking study, participants viewed scenes from the previous experiments, paired with the most frequently named and spatially distinct actions. Results showed a focus on objects in the action-related phrases when assessing a scene-action fit.

Our findings suggest that action identification and scene-action fit assessment rely on overlapping information. Participants predominantly selected objects within the same phrase when identifying items necessary for actions, and eye-tracking data confirmed a focus on these phrases during scene-action fit assessment. This highlights the functional organization of phrases in scenes.

**Keywords:** scene perception, object perception, action, scene grammar

**Presentation type:** Original Research Talk

## Analyzing the Impact of Choice Complexity on Risky Choices

Maohua Nie \*, Sebastian Olschewski , Jörg Rieskamp

*University of Basel*

The challenge of information overload often leads decision-makers to favor simpler, more intuitive options over complex ones, even when the latter offer potentially greater rewards. Previous research has primarily focused on the behavioral phenomenon of complexity aversion, attributing it to the avoidance of cognitive effort.

In this study, we employ a drift diffusion modeling (DDM) approach to explore how complexity shapes decision-making across different experimental contexts. Our experiments manipulate lottery complexity along three dimensions: probabilities (Study 1), outcomes (Study 2), and number of outcomes (Study 3). Beyond comparing decisions involving complex versus simple options, we also examine scenarios where both options are either uniformly complex or simple. This comprehensive design allows us to uncover the cognitive mechanisms underpinning complexity aversion across diverse contexts.

Contrary to prior research, our findings reveal that complexity aversion does not consistently emerge across all three studies. Through DDM, we disentangle the cognitive processes driving these effects. In cases where complexity aversion occurs, our analysis reveals it is primarily driven by pre-valuation bias rather than a discounting effect during decision-making. These results offer a more nuanced perspective on the relationship between complexity and cognitive effort.

When both complex and simple options are presented, complexity influences several facets of decision-making, including response times, choice consistency, risk-taking behavior, and the weighting of rare outcomes.

Our experimental results and computational modeling contribute to a deeper understanding of how complexity shapes risk-taking behavior, offering new insights into the cognitive processes involved in decision-making under complexity.

**Keywords:** Complexity Aversion, Decision-Making, Risk Taking, Drift Diffusion Modeling (DDM), Cognitive Effort

**Presentation type:** Original Research Talk

## Let Me See How I Feel: Imagery Perspective Impacts Reliance on Internal States

Zachary Niese <sup>1\*</sup>, Reuven Dar <sup>2</sup>

<sup>1</sup> *Psychology Department, Eberhard Karls University of Tübingen*, <sup>2</sup>*School of Psychological Sciences, Tel Aviv University*

When imagining events in their lives, people can use their own first-person visual perspective or an observer's third-person visual perspective. Prior work shows that first-person imagery prompts people to understand events in relation to their experiential reactions to them, whereas third-person imagery prompts people to understand events in relation to their conceptual beliefs about them. Similar to the thinking style evoked by third-person imagery, people high in obsessive-compulsive (OC) tendencies exhibit attenuated access to their directly-experienced internal states, prompting them to instead rely on proxies for those states. Across two experiments, the current work tests if first-person (vs. third-person) imagery increases reliance on internal states and might thereby serve as a potential tool to help alleviate forms of OC symptomology. Experiment 1 (N = 295) manipulated imagery perspective as participants imagined hypothetical events. With first-person (vs. third-person) imagery, participants reported a greater likelihood of acting in line with their internal states in the imagined events, and relying less on proxies. Experiment 2 (N = 301) manipulated imagery perspective before participants rated normatively-positive and -negative sounds. Consistent with past research, higher OC symptoms predicted larger discrepancies between participants' ratings and the normed ratings for each sound. Critically, we found that among high OC participants, first-person (vs. third-person) imagery reduced this discrepancy. Thus, across two experiments, we found that first-person (vs. third-person) imagery can increase reliance on internal states, suggesting directions for developing theoretically-driven interventions using first-person imagery to help people increase their reliance on their internal states to alleviate OC symptoms.

**Keywords:** imagery, visual perspective, processing styles, obsessive-compulsive disorder, internal states

**Presentation type:** Original Research Talk

## Most False Recognition Memory Responses Are Due to Reasoning, Not Genuine Memories

Tehilla Ostrovsky, Chris Donkin

*LMU, Munich*

In a typical false-memory experiment, participants study lists of words containing many items from the same category (e.g., countries or body parts). Subsequently, they often falsely recognize unstudied items from the same category during a memory test. Most explanations suggest these false recognition responses represent genuine false memories, arising from a false sense of familiarity generated by unstudied category words. However, others argue that when stimuli have a clear categorical structure, false recognition responses are "strategic" reasoning that test items from the category are more likely to have been studied.

We present the results of three experiments. In the first, we use a computational model to demonstrate that people's confidence in their recognition responses is weaker when based on categorical information. We argue this is because they are relying on reasoning rather than memory. In a follow-up experiment, we replicate the study while asking participants to think aloud as they perform the task. The results show that participants often explicitly reason about categorical information, and their verbalizations differ from those they produce when relying on memory. In the third experiment, we manipulate awareness of categorical information using ad hoc categories (e.g., things a dog chases). We show that false recognition responses were vastly inflated when participants were aware of the categorical information. However, we also observe a slight increase in false recognition rates for highly prototypical category items, even when participants are unaware of the category. This suggests that genuine false memories are possible, albeit rare, in such tasks.

**Keywords:** verbal reports, recognition memory, reasoning

**Presentation type:** Original Research Talk

## How do people invest effort to manage risk?

Thorsten Pachur <sup>1\*</sup>, Jonathan Rolison <sup>2</sup>

<sup>1</sup> *Technical University of Munich*, <sup>2</sup> *University of Essex*

Traditionally, decision making under risk has been studied using scenarios with fixed levels of outcomes and probabilities (e.g., a 50% chance of winning a particular amount of money). In real-

life, however, people can often actively influence the probability of a risky outcome through investing effort (e.g., working overtime to increase the likelihood of a raise). It is currently unclear what factors influence people's effort investment to manage risk in their favor. We report two experiments in which participants were presented with monetary gambles and had the opportunity to engage in an essay-writing task to increase (decrease) the probability of a gain (loss) outcome of the gamble. Experiment 1 (N=102) shows that participants invested more effort (i.e., wrote more words) the larger the outcome and the lower the initial probability of the outcome. In addition, they tended to invest less effort to decrease the probability of a loss than to increase the probability of a gain—suggesting that effort investment is driven by risk attitudes. Based on a computational model, we find that people's effort decisions are characterized by diminishing sensitivity to outcomes and probabilities and that they displayed lower probability sensitivity when managing losses (vs. gains). Experiment 2 (N=100) showed that although participants do not exert the effort required to maximize their chances of a favorable outcome, their effort investment increases when the pay rate was higher. Our results identify behavioral regularities in how people trade-off internal resources against risk and point to a theoretical framework to capture these regularities.

**Keywords:** decision making, decisions under risk, effort, risk aversion, loss aversion, computational modeling

**Presentation type:** Original Research Talk

## Language Production in Bilingual Dyads: The Effect of Speaker Switches and Language Switches

Anna Paschmanns \*, Anna K. Kuhlen , Iring Koch  
*Institute of Psychology, RWTH Aachen University*

This study with 54 participants (27 dyads) investigates whether a bilingual speaker's language production is influenced by the comprehension of another speaker's language. Dyads of bilinguals completed a "joint" picture naming task in which speaker turns were indicated by picture position (left/right). Speakers either engaged in monolingual language production, naming pictures exclusively in L1 or L2, or in bilingual production, switching between L1 and L2 within a single block. In monolingual production blocks, comprehension regarding the other speaker's language was either monolingual (same language) or bilingual (the other language). In bilingual production blocks, language switched every two pictures, regardless of speaker turns. During monolingual production speakers showed longer naming latencies for L1 compared to L2 ("L1 slowing") when exposed to



bilingual comprehension but not for monolingual comprehension. Moreover, speaker switches elicited longer naming latencies in bilingual comprehension compared to monolingual comprehension. Both results indicate that even if speakers did not switch languages themselves, comprehending the other speaker's language influenced their own language production. During bilingual production speakers showed language switching costs when the speaker stayed the same, but these costs were abolished when speakers switched. As in the monolingual production blocks, speaker switches during bilingual comprehension seemed to increase L1 slowing. These findings suggest that speakers employ "reactive" control processes (resulting in switch costs) only in response to the language switching requirements in their own speech, while more proactive language control processes (resulting in L1 slowing) are triggered by comprehending the other speaker's language.

**Keywords:** bilingualism, language production, language switching, joint action, language control

**Presentation type:** Original Research Talk

## **Forward Testing Effect under Stress – Part III: Insights from Acute Retrieval Stress with Related Word Lists**

Bernhard Pastötter <sup>1, 3\*</sup>, Bernadette von Dawans <sup>2, 3</sup>, Gregor Domes <sup>2, 3</sup>, Christian Frings <sup>1, 3</sup>

<sup>1</sup> *Department of Cognitive Psychology, Trier University, Germany,*

<sup>2</sup> *Department of Biological and Clinical Psychology, Trier University, Germany,*

<sup>3</sup> *Institute for Cognitive and Affective Neuroscience (ICAN), Trier University, Germany*

The forward testing effect (FTE) refers to the finding that testing previously studied information enhances memory for subsequently studied new information. The FTE is robust, generalizing across different materials and populations. Two previous studies from our group demonstrated that the FTE is unaffected by acute psychosocial stress during encoding or retrieval for unrelated word lists (Pastötter, von Dawans, Domes, & Frings, 2020, 2023). The present study investigated whether the FTE for related word lists is similarly resilient under acute retrieval stress, given differing theoretical explanations for the FTE with regard to unrelated and related item materials. Participants (N=132) studied three categorized word lists, each containing four exemplars from three repeated semantic categories, in anticipation of a cumulative recall test. In the testing condition, participants were tested immediately on lists 1 and 2, while in the restudy condition, they restudied the lists. After studying list 3, acute psychosocial stress was induced in half of the participants using the Trier Social Stress Test for Groups (TSST-G), while the other half served as controls. Salivary cortisol, alpha amylase, and subjective stress were repeatedly measured. Criterion test results revealed that

list 3 recall was lower in the stress group than in controls. Importantly, the FTE on list 3 recall was significant and equally present in both groups. These findings indicate that the FTE is robust against psychosocial retrieval stress for both unrelated and related materials. The results are discussed in relation to current FTE theories, highlighting its broad applicability and resilience to stress-related impairments.

**Keywords:** episodic memory, testing effects, acute psychosocial stress, cortisol, Trier Social Stress Test for Groups (TSST-G)

**Presentation type:** Original Research Talk

## Hedonic foraging

Olivier Penacchio <sup>1\*</sup>, Ana Clemente <sup>2</sup>

<sup>1</sup> *Computer Vision Center Universitat Autònoma de Barcelona*, <sup>2</sup> *Department of Cognitive Neuropsychology Max Planck Institute for Empirical Aesthetics*

Hedonic evaluation—the assignment of hedonic value to observations as beneficial or harmful, pleasurable or painful—is fundamental to the survival and adaptation of organisms with a reward system. Yet, the mechanisms through which hedonic values guide behaviour are not fully understood, and it remains unclear whether common mechanisms drive behaviour across the spectrum of behavioural complexity and species.

Active inference posits that behaviour is governed by the imperative to minimise variational free energy—a proxy for the divergence between actual and preferred states. In this framework, action, planning and decision-making interact to minimise variational free energy in the future.

We propose *hedonic foraging* as the mechanism through which reward maximisation drives behaviour in organisms with a reward system, with hedonic evaluation monitoring and motivating free energy minimisation. Integrating hedonic evaluation with active inference enables explaining and predicting behaviour as emerging from the interplay between habits, expected free energy (wanting) and variational free energy (liking). Our simulations demonstrate how hedonic foraging accounts for behaviour along a continuum, from basic allostatic processes common to all living organisms (e.g., a *C. elegans* orienting itself in a gradient of nutrients) to sophisticated cultural endeavours typically observed in humans (e.g., music appreciation).

In sum, by mapping hedonic evaluation onto active inference, hedonic foraging explains how hedonic evaluation drives behaviour across scenarios and species with a reward system. Our proposal thus provides a unifying framework grounded in first principles to advance the understanding of motivated behaviour.

**Keywords:** liking, wanting, hedonic evaluation, active inference, free energy, expected free energy, motivated behaviour

**Presentation type:** Original Research Talk

## **Assessing Accuracy and Cue Utilization in AI Judgments: Methods and Applications**

Aaron Petrasch \*

*LMU Munich*

Artificial intelligence is developing at a rapid pace. Researchers and societies are challenged to keep up with and react to advances in this field. Recent work demonstrates the capabilities of Large Language Models (LLMs) to judge characteristics of persons (e.g., traits or emotions) and situations that cannot be explained by the detection and classification of single objects or cues. This talk outlines a framework to critically evaluate the judgmental performance of LLMs. First, I present ways to assess the accuracy of LLMs judging person or situation characteristics, outlining why merely correlating AI judgments with a human criterion may lead to wrong conclusions. Second, I demonstrate an extended Brunswikian lens model to analyze cues that humans and AI use to derive their judgments. This allows researchers to study judgment differences and biases among human and LLM judges. Empirical examples and applications for experimental designs are presented, with both human-written texts and scene images used as stimuli to generate judgments of persons, situations, and cues.

**Keywords:** Person perception, situation perception, accuracy, LLMs, lens model, AI

**Presentation type:** Original Research Talk

## **Response Durations: A flexible, no-cost tool for psychological science**

Roland Pfister \*

*General Psychology, Trier University, Institute for Cognitive and Affective Neuroscience, Trier University*

Response durations for simple key presses are an easily available but heavily underused measure. Whereas response times are integral to the toolbox of experimental psychologists – including many

studies featured on past TeaPs –, any study with standard keypress responses also allows for measuring response durations as the interval from response onset to response offset. Response times and durations are decidedly independent, so that response durations hold great promise as a means to uncover unique perspectives on cognitive processing. I present recent findings on response durations in different contexts to highlight that this inconspicuous measure deserves much more attention than it has attracted so far. Given that it comes at no extra cost for common experimental setups, any researcher is well advised to consider adding the measure of response duration to their empirical toolbox.

**Keywords:** experimental methodology; response times; response durations;

**Presentation type:** Original Research Talk

## **Don't Stop Believin' in Multitasking: Perceived Effort in Serial and Parallel Dual-Task Strategies**

Aleks Pieczykolan \*, Daria Börger

*Rheinische Hochschule Köln*

While extensive research has explored the cognitive foundations of divided attention under dual-task conditions using objective performance measures, such as response times, little is known about the subjective perception of effort in divided attention tasks. Furthermore, evidence suggests that beliefs about multitasking can significantly affect how individuals approach and manage multitasking demands.

In this study, three groups received different versions of information about multitasking before performing eight dual-task blocks (task adapted from Lehle, Steinhauser, & Hübner, 2009). The information was framed as either balanced, presenting both advantages and disadvantages (differentiated framing), or one-sided, presenting only one side of the information (negative or positive framing). Participants retrospectively rated their perceived effort after completing all task blocks. Crucially, they were instructed to use a serial processing strategy for half of the blocks and a parallel strategy for the other half, rating perceived effort separately for each strategy.

Contrary to prior research, serial processing was perceived as less effortful than parallel processing, while it still resulted in the superior performance typically observed. As hypothesized, participants experienced the least overall effort after positive framing. More specifically, post-hoc analyses implied that, for parallel processing, awareness of multitasking's disadvantages—whether presented in the negative or differentiated framing conditions—led to similarly high perceptions of effort. However, framing had no significant influence on performance.

In summary, the results suggest that while mindset may not directly influence the cognitive processes underlying performance, it can play a crucial role in how comfortable individuals feel when performing highly demanding tasks.

**Keywords:** dual task, serial and parallel processing, perceived effort, mindset, cognitive strategies

**Presentation type:** Original Research Talk

## **Uncertainty in cognitive control demands leads to information-seeking: The role of Alpha Band Activity**

Seema Prasad <sup>1\*</sup>, Christian Beste <sup>1, 2</sup>

<sup>1</sup> *Cognitive Neurophysiology, Department of Child and Adolescent Psychiatry, Faculty of Medicine, TU Dresden,* <sup>2</sup> *German Center for Child and Adolescent Health (DZKJ), partner site Leipzig/Dresden, Dresden, Germany*

Cognitive control – the ability to regulate information processing in line with current goals – is an important aspect of cognitive functioning. We examined whether uncertainty in cognitive control demands leads to higher processing of cues that can help resolve this uncertainty. We administered the Go/NoGo task with two NoGo:Go ratio manipulations (4:5 and 1:6). Before the presentation of the Go/NoGo target, colored cues that were either reliably predictive (80%) or unpredictable (50%) of the target type were shown. The neurophysiological data was analyzed with time-frequency and beamforming approaches to understand the oscillatory dynamics and their sources. Aperiodic activity was also analyzed to examine the effects on neuronal “noise”. The behavioral results showed an effect of the cues only in the high uncertain (4:5), predictive cues (80%) condition indicating that uncertainty in the demands of response inhibition makes people susceptible to external cues that can help resolve this uncertainty. This was accompanied by strong alpha band activity in the orbitofrontal cortex following cue onset only in the 80% 4:5 condition suggesting that alpha band activity plays a significant role in the selective processing of cues relevant to the current task. Aperiodic components showed no reliable effects. These findings have implications towards understanding the relationship between information-seeking and uncertainty in the context of cognitive control and the role of periodic and aperiodic neural activity.

**Keywords:** uncertainty, alpha-band, aperiodic, cueing, cognitive control, inhibition

**Presentation type:** Original Research Talk

## Cognitive control in older adults: dealing with frequent task interruptions

Tara Radovic \*, Torsten Schubert

*Martin Luther University Halle-Wittenberg*

In younger adults dealing with frequent interruptions leads to improved performance when resuming a task after an interruption and slower performance in uninterrupted tasks. This indicates a shift towards a proactive mode of cognitive control to deal with that expected interference (Dual mechanism of control framework, DMC, Braver, 2012). It was suggested that age-related decline is more prominent in the tasks requiring proactive mode implying that older adults might not benefit from high interruption frequency when resuming the task, but also not show a slowdown in uninterrupted tasks as younger adults. To investigate this assumption, in the present study two groups of older adults (mean age 75 years old) performed a serial five-step task (primary task) which was interrupted by a classification task either in 25% of primary tasks (Group 1) or in 75% of tasks (Group 2). After completion of the interruption task, resuming the primary task at the correct step was required. Dependent variables were response times and rates of sequence errors (deviations from the prescribed order of steps), measured at the step after an interruption (resumption performance) and in the uninterrupted steps. The results revealed that resumption performance was faster in the high-frequency group and more accurate than in the low-frequency group. At the same time, uninterrupted performance was slower in the high-frequency group compared to the low-frequency group. The results suggest that older adults are able to employ a proactive mode of cognitive control under high interruption frequency in a similar way as younger adults.

**Keywords:** proactive control, resumption performance, sequence errors, interruption frequency

**Presentation type:** Original Research Talk

## Influence of believed AI involvement on the perception of digital medical advice

Moritz Reis <sup>1\*</sup>, Florian Reis <sup>2</sup>, Wilfried Kunde <sup>1</sup>

<sup>1</sup> Department of Psychology, University of Würzburg, <sup>2</sup> Medical Affairs, Pfizer Pharma GmbH

Large language models offer novel opportunities to seek digital medical advice. While previous research primarily addressed the performance of such artificial intelligence (AI)-based tools, public perception of these advancements received little attention. In two preregistered studies (N = 2,280), we presented participants with scenarios of patients obtaining medical advice. All participants

received identical information, but we manipulated the putative source of this advice ('AI', 'human physician', 'human + AI'). 'AI'- and 'human + AI'-labeled advice was evaluated as significantly less reliable and less empathetic compared with 'human'-labeled advice. Moreover, participants indicated lower willingness to follow the advice when AI was believed to be involved in advice generation. Our findings point toward an anti-AI bias when receiving digital medical advice, even when AI is supposedly supervised by physicians. Given the tremendous potential of AI for medicine, elucidating ways to counteract this bias should be an important objective of future research.

**Keywords:** AI, advice taking, medicine, health-care

**Presentation type:** Original Research Talk

## **Neural and computational mechanisms of auditory statistical learning in individuals with and without dyslexia**

Hanna Ringer <sup>1, 2\*</sup>, Tatsuya Daikoku <sup>1, 3</sup>

<sup>1</sup> *Next Generation Artificial Intelligence Research Center, Graduate School of Information Science and Technology, The University of Tokyo, Tokyo, Japan*, <sup>2</sup> *Research Group Neurocognition of Music and Language, Max Planck Institute for Empirical Aesthetics, Frankfurt am Main, Germany*, <sup>3</sup> *Centre for Neuroscience in Education, University of Cambridge, Cambridge, UK*

Listeners implicitly use statistical regularities to segment sound input into meaningful units, e.g., a continuous speech stream into separate phonemes. This innate statistical learning ability likely plays a crucial role for language development. In particular, the efficient formation of representations for distinct phonemes from the speech input is an important foundation for reading and spelling development. Thus, it was suggested that literacy deficits in dyslexia are grounded in poor statistical learning abilities. In my talk, I will present two parts of an ongoing project that combines EEG and computational modelling to study the neural and computational mechanisms behind the link between statistical learning and literacy skills, which so far remains poorly understood. First, I will present the results of an EEG study that investigated neural tracking of single elements, i.e., individual tones, and statistical chunks, i.e., fixed triplets of tones that always occurred together, within a continuous tone sequence in adults with and without dyslexia. Individuals with dyslexia showed an altered pattern of neural tracking, and overall stronger tracking of statistical chunks (relative to single elements) was associated with better spelling skills. Second, I will introduce a modelling study that aims to model individual learning trajectories while participants learn the statistical triplet structure of the sequence to unravel systematic differences between individuals with and without dyslexia. Together, these data help to understand the link between

statistical learning and literacy skills, which provides an important basis for the development of novel intervention approaches to ameliorate phonological deficits in dyslexia.

**Keywords:** statistical learning, dyslexia, EEG, neural tracking

**Presentation type:** Original Research Talk

## **Mechanisms of Proactive Language Control: Evidence from Cognate Facilitation**

Tanja C Roembke \*, Elena Benini , Irving Koch , Luca Moretti  
*RWTH Aachen University*

Language control is needed to regulate the activation of known languages. One can distinguish between two types of language control: reactive and proactive. In contrast to the better understood reactive control, proactive language control is thought to be used to adapt language activation in advance—before conflict has arisen. Proactive language control can be investigated by looking at cognate production in different task settings: Cognates are translation-equivalent words that are similar or even identical across languages in phonological and/or orthographic form (e.g., BABY/BABY [English/German]). Due to cognates' high form overlap, language co-activation results in low conflict when encountering them. Previous research has shown that pictures of cognates are more easily named (i.e., fewer errors, smaller RTs) by bilinguals than non-cognates. However, such cognate facilitation may depend on the exact task demands and language control state a bilingual is in. Across two experiments, we thus investigated how proactive language control modulates language co-activation and in turn cognate facilitation in situations of low and high conflict. In Experiment 1 (N = 85, preregistered), we manipulated the frequency of cognates versus non-cognates within blocks of a L2 written picture naming task. As hypothesized, we found a larger cognate facilitation effect in blocks with more cognates (majority-cognate; low conflict) than in blocks with more non-cognates (majority-non-cognates; high conflict), suggesting that people proactively adapt language activation to optimize ease of language production. In Experiment 2 (planned N = 80), we plan to investigate the exact mechanism by which co-activation of translation-equivalent words is regulated.

**Keywords:** Bilingualism; cognate facilitation; language control; language production; proactive language control



**Presentation type:** Original Research Talk

## **Levels of Processing Effects on Visual Associative Memory for Basic Perceptual Features**

Nicolas Rothen \*, Mirela Dubravac , Chhavi Sachdeva , Rebecca Ovalle-Fresa  
*UniDistance Suisse, Brig, Switzerland*

The levels of processing (LOP) framework, extensively studied with verbal materials, suggests that deeper semantic encoding enhances memory compared to shallow perceptual encoding. While prior research has explored this effect using nameable images, little is known about LOP effects on basic visual features like color. We investigated LOP effects on color recall in visual associative memory. In a first laboratory-based study (N=187), we examined memory for object–color and fractal–color associations using recognition and cued recall paradigms. Results revealed robust LOP effects. In a second online study (N=307), we replicated and extended the cued recall paradigm for object–color associations with a size judgment condition to minimize potential confounding factors like self-reference and task relevance. Memory performance was consistently superior under deep encoding conditions (e.g., real-life size judgments) compared to shallow encoding (e.g., perceptual size judgments). Together, these findings demonstrate the impact of LOP beyond verbal materials to basic visual features and highlight the importance of elaborative processes in visual associative memory.

**Keywords:** memory, levels of processing, working memory, long-term memory

**Presentation type:** Original Research Talk

## **How Cognitive Control Navigates Emotion: Insights from a Drift Diffusion Model**

Maryam Sadeghi Talarposhti \*, Leif E. Langsdorf , Torsten Schubert  
*Institute for Psychology, Martin Luther University Halle-Wittenberg*

The influence of affective task content on task switching remains an unresolved issue. According to the affect dominance hypothesis, the enhanced processing of affective task content leads to stronger activation of the affective task set, resulting in increased switch costs for affective tasks compared to neutral tasks. Such asymmetric switch costs suggest that the affective task is

processed as a more dominant task, requiring inhibition to enable switching to the less dominant neutral task.

In this study, we applied a drift-diffusion model (DDM) to examine asymmetrical switch costs during affective task switching. Participants performed a cued task-switching paradigm, categorizing either gender (neutral) or facial emotions (affective) while alternating between task repetition and switching. Consistent with the affect dominance hypothesis, our empirical findings revealed greater switch costs for affective tasks than for neutral tasks.

Using hierarchical drift diffusion modeling (HDDM), we identified distinct cognitive mechanisms underlying this effect. Affective tasks were associated with slower evidence accumulation (lower drift rates) and increased response caution (higher decision boundaries), reflecting the combined demands of cognitive control and emotional processing. These findings highlight the significant influence of affective content on task strength and cognitive load, offering new insights into the interplay between emotion and attention. This work provides a computational perspective on how emotional salience disrupts cognitive control and establishes a foundation for refining task-switching theories in emotionally charged contexts.

**Keywords:** Cognitive Control, Drift Diffusion Model, Asymmetrical Switch Costs, Emotional Processing, Task Switching

**Presentation type:** Original Research Talk

## **Does content matter? – Comparing the continued influence effect for different materials**

Nadia Said <sup>1\*</sup>, Carina Debnath <sup>1</sup>, Nicole Antes <sup>2</sup>

<sup>1</sup> *Department of Psychology, University of Tübingen, Schleichstraße 4, 72076 Tübingen, Germany,*

<sup>2</sup> *Leibniz-Institut für Wissensmedien, Schleichstraße 6, 72076 Tübingen, Germany*

In today's world of fake news, it is becoming increasingly difficult to tell what is true and what is not. One concerning phenomenon is that belief in misinformation continues despite correction, known as the continued influence effect (CIE). The CIE is typically investigated by presenting participants with a sequence of short statements about an event containing misinformation. The misinformation is then either retracted or retracted with an alternative explanation about what the correct information is. Currently, the materials used vary in length, content, and target audience (usually English-speaking). As misinformation can range from emotionally charged topics (e.g., political content) to more mundane ones (e.g., gossip about a celebrity), it is important to investigate whether correction

of such information is content dependent. In a first step we thus compared three typically used materials (two studies: N = 118, student sample, N = 386 quota-based sample) to investigate whether there is a difference regarding the CIE. We adapted the materials for a German sample and adjusted the materials such that they are similar in length, position of the misinformation, and questions asked. Results showed that while we replicated the typical CIE pattern with retraction including an alternative explanation being the most effective in reducing the CIE, there were differences regarding the CIE for the control condition (study 1) and for the control and the retraction condition (study 2). Thus, pointing towards a content dependency of the CIE. Future studies should therefore take a possible influence of the materials used into account.

**Keywords:** misinformation, continued influence effect, materials

**Presentation type:** Original Research Talk

## **The influence of age and age simulation on sorting and counting depends on cognitive load**

Sabine Schaefer \*, Anna Heggenberger  
*Sport Science Institute, Saarland University*

Handling and manipulating small objects may be compromised in older age due to declines in sensory abilities and fine-motor control (Kuehn et al., 2018). Increasing cognitive load can further exacerbate adult age differences. The current study investigates whether sensory deprivation makes young adults perform similar to old adults (Vieweg & Schaefer, 2020). We used glasses that reduce near visual acuity and gardening gloves to simulate age-related constraints in young adults. Young adults were randomly distributed across four experimental groups: no simulation (n= 12), glasses (n= 13), gloves (n= 13), or both (n= 11), and were compared to middle-aged and older adults (age range 40 -77 years; n= 17). Participants were instructed to sort and count sets of 100 coloured chocolate lentils by colour over the course of 8 sessions. The number for each colour should be written down immediately after counting it (= no load), or only after all five colours had been counted (= load). Wearing gloves increased the counting times of young adults to the level of middle-aged and older adults. Working with a cognitive load as compared to no load increased counting times for older adults and for young adults without gloves, but the load-effect was absent in young adults with gloves. This indicates that young adults can “use” their slowed motor performance to increase cognitive processing. We argue that this is a compensatory strategy that is not available to older adults. Future research will use sensory deprivations in older adults as well.

**Keywords:** aging, age simulation, counting, sorting, cognitive load

**Presentation type:** Original Research Talk

## **The influence of retrieval context similarity and storage duration on retroactive interference between working memory and episodic memory**

Daniel Schneider \*, Sahcan Özdemir , Melinda Sabo

*Leibniz Research Centre for Working Environment and Human Factors*

This study explores how episodic memory (EM) is vulnerable to retroactive interference from working memory (WM). Therefore, we placed a WM task between the encoding and retrieval phases of an EM task. In the EM task, participants learned associations between visual objects and circular locations. An initial recall phase including feedback was then carried out to better consolidate this association. Afterwards, the same objects were used in a WM task, with locations systematically shifted by 120°. We manipulated WM task conditions to investigate retroactive interference mechanisms: In the 'identical testing' condition, retrieval formats for both tasks were matched (continuous report of location by changing the object's circular position). In the 'deviant testing' condition, retrieval formats differed between tasks (using spatial placeholders instead of the actual objects for continuous report in the WM task). Additional conditions assessed the effect of shorter versus longer WM storage durations without testing, while the baseline condition involved objects solely used in the EM task. Retroactive interference was measured as reduced precision in EM recall relative to baseline. Results demonstrated significant interference, with the largest drop of precision in the identical testing condition, followed by the deviant testing condition. Conditions without testing exhibited weaker interference effects, irrespective of storage duration. These findings suggest that EM is particularly sensitive to retroactive interference from WM processing when retrieval contexts are similar. Overall, this study challenges the traditional modular perspectives on memory systems and highlights the integrated nature of cognitive mechanisms involved in encoding, maintaining and retrieving memory representations.

**Keywords:** working memory, episodic memory, retroactive interference

**Presentation type:** Original Research Talk

## **Temporal-Difference Learning in Uncertain Choice: A Reinforcement Learning-Diffusion Decision Model of Two-Stage Decision-Making**

Nicola Schneider \*, Andreas Voss

*Heidelberg University*

Behavioral adaptation in probabilistic environments requires learning through trial and error. While reinforcement learning (RL) models can describe the temporal development of preferences through error-driven learning, they neglect mechanistic descriptions of single-trial decision-making. On the other hand, sequential sampling models such as the diffusion decision model (DDM) allow for the mapping of state preferences on single response times. We present a Bayesian hierarchical RL-DDM that integrates temporal-difference (TD) learning to bridge these perspectives. Our implementation incorporates variants of TD learning, including SARSA, Q-Learning, and Actor-Critic models. We tested the model with data from N = 60 participants in a two-stage decision-making task. Participants exhibited learning over time, becoming both more accurate and faster in their choices. They also reflected a difficulty effect, with faster and more accurate responses for easier choices, as reflected by greater subjective value differences between available options. Model comparison using predictive information criteria and posterior predictive checks demonstrated that the RL-DDM provided a better fit compared to standalone RL or DDM models. Notably, the RL-DDM captured both the temporal dynamics of learning and the difficulty effect in decision-making. Our work represents an important extension of the RL-DDM into temporal-difference learning.

**Keywords:** Diffusion decision model, Reinforcement Learning, Temporal-difference learning, Sequential sampling models, Decision-making, Cognitive modeling, Bayesian statistics

**Presentation type:** Original Research Talk

## **Unlocking Multitasking Potential: How Task Switching Training Shapes Individual Differences in Processing Modes**

Annemarie Scholz \*, Jovita Brüning

*Otto-von-Guericke-Universitaet Magdeburg*

Individual differences in serial versus parallel processing of multiple tasks are well documented, yet the extent to which they can be altered by training remains unclear. To address this, we use the task-switching with preview (TSWP) paradigm to examine whether preferred processing modes in task-switching can be modified with training and how such changes influence multitasking

efficiency. In TSWP, two tasks alternate every three trials, with the currently irrelevant task's stimulus (preview) remaining visible, allowing for task pre-processing. The key result from TSWP is that some individuals process the preview in parallel, achieving frequent fast switches and corresponding switch benefits, whereas others opt for serial processing. Our currently ongoing training study comprises five sessions: Sessions 1 (Pre-Test) and 5 (Post-Test) include TSWP training and a transfer TSWP test using a different set of stimuli, while Sessions 2-4 consisted of TSWP training only. The preliminary analysis based on N = 20 participants (goal sample size N = 40) currently suggests an overall increase in fast switch rates across sessions, reflecting a shift toward overlapping processing. This effect is also evident in the transfer test data, indicating stimulus-independent improvements and generalization to new tasks. We additionally included pre- and post-measures of working memory capacity and fluid intelligence to explore their relationship with processing mode changes. The final results of this first experiment will be discussed, along with the design of a follow-up experiment where we will explicitly instruct individuals to process the tasks either in a more serial or parallel way.

**Keywords:** Task Switching, Parallel Task Processing, Training, Individual Differences

**Presentation type:** Original Research Talk

## **That retrieves a lot for me: Meaningfulness increases retrieval of stimulus-response bindings**

Lars-Michael Schöpper <sup>1, 2\*</sup>, Ruth Laub <sup>1, 2</sup>, Hannah Franke <sup>1</sup>, Birte Moeller <sup>1, 2</sup>, Christian Frings <sup>1, 2</sup>

<sup>1</sup> *Trier University, Department of Cognitive Psychology*, <sup>2</sup> *Trier University, Institute for Cognitive & Affective Neuroscience (ICAN)*

Responding to stimuli with certain features leads to a coupling of stimulus features and responses into so-called event files. If any component of this event file repeats, previous information is retrieved, affecting performance: In case of partial repetitions, responding is impaired. The resulting stimulus-response (S-R) binding effects can be modulated by top-down or bottom-up factors. In the current study, we were interested in how S-R binding effects are affected by familiarity and meaningfulness of stimuli. Participants discriminated the color of familiar and meaningful words and unfamiliar and meaningless non-words (Experiment 1) and familiar and meaningful letters and unfamiliar and meaningless mirrored letters (Experiment 2). S-R binding effects were larger for familiar and meaningful stimuli. In Experiment 3, we used names of musical instruments as stimuli with constant meaningfulness that only varied in their familiarity due to their frequency in the German language. Here, mere familiarity did not modulate S-R binding effects. Lastly, in Experiment

4, we asked participants to learn names and characteristics of bacteria images created by us – while equally often presenting bacteria images without name or characteristic; this should result in stimuli with equal familiarity but different degree of meaningfulness. In fact, stimuli with previously associated meaning again led to larger S-R binding effects. These results suggest that effects of binding and retrieval can be boosted by features that exceed pure perceptual components – specifically, meaningfulness of stimuli.

**Keywords:** Action control, Stimulus-response binding, Familiarity and meaningfulness, Attention

**Presentation type:** Original Research Talk

## Confidence intervals for within-subjects designs

Alexander C. Schütz <sup>1, 2\*</sup>, Karl R. Gegenfurtner <sup>2, 3</sup>

<sup>1</sup> AG Sensomotorisches Lernen, Philipps-Universität Marburg, <sup>2</sup>Center for Mind, Brain and Behavior, Marburg, Gießen & Darmstadt, <sup>3</sup>Abteilung Allgemeine Psychologie, Justus-Liebig-Universität Gießen

Within-subject, repeated-measures designs are frequently used in studies in experimental psychology. They achieve higher statistical power than between-subject designs, because the effects of the experimental manipulation can be analysed within each participant, which allows to discount variance between participants. However, this comes with the challenge of how to display in scientific graphs the within-subject variance for the comparison of paired measurements and the between-subject variance for each measurement separately. In traditional bar-like graphs, where the different levels of the paired measurements are separated on the abscissa, and the dependent variable is shown on the ordinate, one can display either between- or within-subject confidence intervals.

We describe a method how to display both, between and within-subject confidence intervals in scatter plots. A diagonal confidence interval can be used to infer the statistical significance of the difference between two paired measures by comparing it against the positive main diagonal in the scatter plot. We evaluated such diagonal confidence intervals by asking scientists to interpret between- and within-subject effects in four different types of graphs: scatter plots with classical between-subject confidence intervals along the horizontal and vertical axes, scatter plots with additional diagonal, within-subject confidence intervals and traditional bar-like graphs with either between- or within-subject confidence intervals. The results showed that between- and within-subject effects can be interpreted with high certainty and accuracy in scatter plots. Thus, scatter

plots with diagonal within-subject confidence intervals are easy to generate and can be interpreted intuitively.

**Keywords:** Methods, Statistics, Confidence intervals, Repeated measures, Scatter Plots

**Presentation type:** Original Research Talk

## **Of facts and faces: Social saliency and visual identifiability shape third-party interventions**

Olivia Seubert <sup>1\*</sup>, Leticia Rettore Micheli <sup>2</sup>, Anne Böckler <sup>1</sup>

<sup>1</sup> *Julius-Maximilians-Universität Würzburg*, <sup>2</sup> *Universiteit Leiden*

When witnessing norm violations (e.g., stealing), initially uninvolved individuals often invest their own resources to restore justice, either by punishing the offender or compensating the victim. While explicit instructions to focus on the offender or victim have been shown to influence attention and the resulting actions (i.e., the decision to punish or compensate), the current study investigated more implicit, subtle means of shaping third-party decision-making. In three preregistered experiments (N = 324), participants played an incentivized third-party justice game. We examined how different social cues (face, gaze, personal information) affect preferences for (i) the type of intervention (punish, compensate, do nothing) and (ii) its intensity.

Controlling for participants' baseline behavior as well as justice sensitivity and empathic concern, Experiment 1 showed that displaying a portrait photo of the offender increased punishment, while showing a photo of the victim increased compensation; gaze direction of the person in the photo had no effect. In Experiment 2, when both photos were presented simultaneously, participants invested more chips when the victim displayed direct (vs. averted) gaze, especially for compensation. Experiment 3 revealed that providing written information (i.e., name and a unique personal fact) about either the offender or victim, rather than a photo, did not affect third-party decisions. Across experiments, baseline preferences and unfairness of the witnessed transgression consistently influenced intervention tendencies.

We conclude that social cues, particularly those capturing bottom-up social attention (e.g., faces), can shape third-party decisions. Findings are also discussed in the context of the identifiable victim (and offender) effect.

**Keywords:** third party preferences, social attention, social interaction, gaze, identifiability

**Presentation type:** Original Research Talk



## The Influence of Directed Forgetting on Emotional Associative Memory

Dipti Singh <sup>1\*</sup>, Manish Kumar Asthana <sup>1, 2</sup>

<sup>1</sup> *Department of Humanities & Social Sciences, Indian Institute of Technology Roorkee, India,*

<sup>2</sup> *Department of Design, Indian Institute of Technology Roorkee, India*

One way of voluntarily disregarding unwanted memories is through Directed Forgetting. This technique involves intentionally suppressing unwanted information based on the forgetting cues (Macleod, 1998). Previous studies have majorly focused on declarative memory performance. Here, the present study examines how directed forgetting affects the encoding of emotional associative memory, and what are the associated electrophysiological responses within auditory conditioning paradigm. Seventeen participants underwent the experiment with 40 images paired either to an aversive sound (CS+) or no sound (CS-). In acquisition phase, all participants were asked to remember one half and forget the other half of the stimuli based on the presentation of forget cue. Acquisition phase was followed by a recall, recognition and liking ratings task for the combined measurement of memory. Participants recalled significantly more "remember" items than "forget" items ( $F(1,16)=11.51, p<.01, \eta^2=.42$ ) and had higher recall for CS- items compared to CS+ items ( $F(1,16) = 9.02, p <.01, \eta^2=.36$ ). Participants were more accurate in categorizing "remember" items than "forget" items for both CS+ ( $t(16)=3.06, p<.01$ ) and CS- stimuli ( $t(16)=4.69, p<.001$ ). Liking ratings revealed a significant interaction between stimulus and instructions ( $F(1,16)=7.79, p=.013, \eta^2=.33$ ). EEG analysis demonstrated CS+ stimulus elicited increased peaks in the delta and beta power between the time period of 0-2 and 6-8 secs respectively. Alpha and beta power peaks for cue presentation around the time period of 0–2 seconds, indicating inhibition of memory (Scholz et al., 2021). The findings can potentially offer therapeutic benefits for individuals dealing with traumatic memories.

**Keywords:** Directed Forgetting, Emotional Associations, Encoding, Auditory Conditioning, EEG

**Presentation type:** Original Research Talk

## All about that base(line) - The importance of baseline measurements in spatial perception

Paula Soballa <sup>1, 2\*</sup>, Christian Frings <sup>1, 2</sup>, Simon Merz <sup>1, 2</sup>

<sup>1</sup> *Trier University,* <sup>2</sup> *Institute for Cognitive and Affective Neuroscience @ Trier University*

Spatial perception of target objects in our environment is a central aspect of daily life and therefore the subject of extensive research. It has been shown that spatial tasks are influenced by different

biases, such as the foveal localization bias or overestimations of the covered distance of moving objects. Importantly, researchers commonly use the actual target location as a benchmark for estimated target locations and any deviations are interpreted as a meaningful consequence of specific experimental manipulations. Yet, it is questionable if a comparison with an otherwise identical baseline task would be more advisable to account for potential task-unspecific, general biases. Using a simple target localization task, we provide empirical evidence that baseline localizations deviate from the actual target location and that using the actual target location as a benchmark for specific experimental manipulations leads to mischaracterization of observed effects on target localization. Our results offer explanations why inconsistent results may have been observed regarding localization biases and underline the importance of incorporating baseline measurements in spatial tasks.

**Keywords:** Baseline trials, localization biases, spatial perception, landmark distortions

**Presentation type:** Original Research Talk

## **The Simon Effect in Embodied Cognition: Enhanced Spatial Processing or Increased Stimulus-Response Binding in Near-Hand Space?**

Aldo Sommer <sup>1\*</sup>, Roman Liepelt <sup>2</sup>, Rico Fischer <sup>1</sup>

<sup>1</sup> *Department of Psychology, University of Greifswald, Germany*, <sup>2</sup>*Faculty of Psychology, General Psychology: Judgment, Decision Making, Action, University of Hagen (FernUniversität in Hagen), Hagen, Germany*

Studies in embodied cognition demonstrated larger Simon effects when participants place their hands close to stimuli in comparison to far from them. The present study investigated the cognitive mechanisms underlying the near-hand effect under the assumption of enhanced Stimulus-Response (S-R) binding or enhanced spatial processing in the near-hand space. In two within-subject experiments the S-R mapping was manipulated by instruction, and by having participants wear colored gloves that shared the color of the stimuli. In Experiment 1, participants wore gloves that matched one color of the two stimuli of the Simon task. The results revealed larger a Simon effect in the Stimulus-Hand proximal in comparison to the Stimulus-Hand distal condition. However, the gloves' color did not impact the near-hand effect. In Experiment 2, a Hedge and Marsh (1975) reverse Simon paradigm was implemented, in which the color of the gloves was changed into a relevant task feature through an incompatible S-R color mapping. Thus, participants wore a red and a blue glove on either the left or right hand and were instructed to respond with the red glove to the blue stimulus and the blue glove to the red stimulus. The results of Experiment 2 revealed a

reversed Simon effect. However, the reversed Simon effect was not modulated by the Stimulus-Hand distance. The results of both Simon experiments provide evidence for an enhanced spatial processing rather than for a modulated S-R binding process in the near-hand space.

**Keywords:** Nearby-Hand Effect, Stimulus-Hand Proximity, Simon Task, Spatial Attention

**Presentation type:** Original Research Talk

## **Breathing helps timing**

Yuze Song \*, Liyu Cao

*Zhejiang University*

Recent studies have shown higher brain functions like motor control and cognition are coupled with the breathing cycle. Here we investigated if breathing is involved when participants perform a time estimation task. In the talk, I will present evidence supporting an involvement of breathing in time estimation. Participants estimated the end point of a short duration (e.g. 500 ms) by giving a keypress. The start point of the duration was either marked by a visual stimulus (passive condition) or by a keypress from the participants (active condition). The estimated duration was significantly shorter in the active condition than in the passive condition (i.e. the temporal binding effect). Importantly, significant differences in the breathing pattern was also found between the two conditions. In general, participants tended to start exhalation after the duration start point. However, the exhalation started earlier in the active condition than in the passive condition, which is consistent with the earlier indication of the duration end point in the active condition than in the passive condition. Furthermore, the time of exhalation predicted the results of time estimation at the individual level. The current study highlights breathing as an internal cue for time estimation, at least when the estimated time is short (e.g. within 1 second).

**Keywords:** Breathing, Temporal Binding, Time Estimation

**Presentation type:** Original Research Talk

## Systematic Review of the Perception and the Aesthetics of Sustainable Fashion Design

Lotta Straube <sup>1, 2\*</sup>, Claus-Christian Carbon <sup>1</sup>, Christian Zigel <sup>2</sup>

<sup>1</sup> *Otto-Friedrich University Bamberg*, <sup>2</sup> *Coburg University of Applied Sciences*

The global fashion and textile industry operates on a linear “take-make-waste” model, thus creating a clear need for sustainable and circular transformation. The consumer adoption of sustainable products plays an essential role in enabling this significant paradigm shift. However, research on the perception of sustainable fashion often focuses on marketing messages and specific product claims. Since the product is not always accompanied by these explicit messages across its lifecycle, it is necessary to better understand the perception and particularly the aesthetics of the product itself to derive practical implications for making sustainable fashion the new norm. We used a systematic review of research in psychology and adjacent fields to create an overview of existing knowledge, employed methods, and research paradigms used. In the covered research, aesthetic differences are explored between product components like natural and synthetic fabrics, dyes and finishing technologies. The effects of the product in its entirety are also covered, providing insight into the effects of e.g., classical or zero waste design. Moreover, the selection of product groups is shown to play a role in consumer perception, due to factors like familiarity or proximity to skin. The adopted research methods span a wide quantitative and qualitative range with research interventions at the design stage, final product pre- and post-sale. Beyond outlining key aspects of previous literature, this article provides an outlook for future interdisciplinary experimental research about product design as a means to understanding and navigating the transition to a more circular industry.

**Keywords:** Aesthetics, Perception, Systematic Literature Review, Sustainable Fashion

**Presentation type:** Original Research Talk

## **Saccade selection is driven by physiologically measurable costs**

Christoph Strauch <sup>1\*</sup>, Damian Koevoet <sup>1</sup>, Sebastiaan Mathôt <sup>2</sup>, Laura Van Zantwijk <sup>1, 3</sup>, Marnix Naber <sup>1</sup>, Stefan Van der Stigchel <sup>1</sup>

<sup>1</sup> *Utrecht University, Experimental Psychology, Helmholtz Institute*, <sup>2</sup> *University of Groningen*,

<sup>3</sup> *Humboldt University of Berlin*

Selecting the next saccade target is one of the most frequent decisions humans make, shaping perception and influencing broader cognitive processes. Current models of saccade selection emphasize three key drivers: the observer's goals, selection history, and the physical salience of stimuli. Recent advances, however, highlight the importance of an additional factor: the intrinsic cost of shifting attention. While theoretically compelling, these costs could not be quantified physiologically.

I will share recent findings demonstrating that intrinsic eye-movement costs can be physiologically measured using pupil size – an established indicator of effort. After mapping saccade costs across directions, we examined saccade preferences using a free-choice paradigm across identical saccade targets. Our results show that participants preferred less costly directions over more effortful ones. Importantly, pupil-inferred costs also predicted saccade preferences when the saliency of potential targets was experimentally manipulated. In these cases, both saliency and cost jointly influenced saccade selection. Finally, we extended this investigation to a visual search task in naturalistic scenes. Here, we observed that cost-driven preferences remained robust, underscoring the significant and generalizable role of cost in saccade selection. These findings suggest that incorporating intrinsic saccade costs into attentional models is critical for a comprehensive understanding of saccade behavior.

**Keywords:** Visual attention, eye movements, attentional selection, pupillometry

**Presentation type:** Original Research Talk

## **What drives the associative memory deficit in healthy aging?**

Carolyn Streitberger <sup>\*</sup>, Beatrice G. Kuhlmann

*University of Mannheim*

The associative deficit hypothesis posits that older adults perform worse on long-term memory tasks than younger adults because they have difficulty creating and retrieving associations between different units of information (Naveh-Benjamin, 2000). We aimed to replicate this effect and to determine if it is driven by a difficulty in storing (i.e., creating) and/or retrieving the associations.

Previous studies on the locus of this deficit have yielded mixed results. Thus, we used two paradigms with different materials, allowing us to test the robustness of our results. Specifically, in the first paradigm, we presented clusterable words from a category (e.g., cat & dog) and singleton words without a clusterable associate, and after a brief distractor phase, participants completed a free recall task (pair-clustering paradigm; Batchelder & Riefer, 1980). The second paradigm used cue-target learning of weakly associated pairs (e.g., flame - heat) and tested memory with free and cued recall (free-then-cued-recall paradigm; Rouder & Batchelder, 1998). The behavioral data from our younger (18-35 years) and older adults (at least 60 years) replicate the associative deficit. However, our modeling results suggest different processes to drive this deficit. This may indicate that the storage and retrieval estimates from the two multinomial models do not represent the same processes. Or maybe clusterable category words are easier to remember than associations between previously unrelated words, or maybe older adults engage more in the pair-clustering paradigm because they are actively searching for the related pair word.

**Keywords:** associative deficit, aging, associative long-term memory, multinomial modeling, storage-retrieval model

**Presentation type:** Original Research Talk

## Disgust Retrospectively Enhances Memory for Categorically Related Neutral Stimuli

Sinem Söylemez <sup>1\*</sup>, Aycan Kapucu <sup>2</sup>, Münevver Yılmaz <sup>1</sup>, Buse Nur Toraman <sup>1</sup>

<sup>1</sup> Manisa Celal Bayar University, <sup>2</sup> Ege University

Disgust provides an advantage in episodic memory. Research suggests this advantage applies not only to inherently disgusting stimuli but also to neutral stimuli associated with disgust. However, it remains unclear whether neutral stimuli sharing categorical features with disgust-associated stimuli (but lacking direct association) also benefit from this advantage. To investigate this, a categorical conditioning paradigm was employed. Objects from two categories (vehicles and furniture) were paired with either disgust-related images (US+) or neutral images (US-). In the first stage, participants viewed 30 objects from each category individually. In the second stage, category conditioning involved a separate set of 30 objects from each category. Episodic memory was tested immediately after learning or after a 24-hour or 1-week delay. It was hypothesized that objects from the disgust-associated category would be remembered better, even without direct association, due to acquired disgust value. Emotional ratings showed that participants rated CS+ stimuli as more

disgusting and negative than CS- stimuli in the second stage, with no difference in the first stage. ROC analysis revealed superior recognition accuracy and liberal bias for categorical stimuli presented in the second stage compared to the first. CS+ stimuli were remembered more accurately and with greater liberal bias than CS- stimuli, regardless of stage or delay. Disgust-associated categories retrospectively enhance episodic memory, underscoring the nuanced influence of disgust on memory processes.

**Keywords:** disgust, category conditioning, neutral stimuli, episodic memory

**Presentation type:** Original Research Talk

## Prior Scene Information Shapes Neural Dynamics of Face Detection in Natural Contexts

Sule Tasliyurt-Celebi <sup>1\*</sup>, Sophia Gruber <sup>1</sup>, Daniel Kaiser <sup>2,3</sup>, Katharina Dobs <sup>1,3</sup>

<sup>1</sup> *Department of Psychology, Justus Liebig University Giessen*, <sup>2</sup> *Department of Mathematics and Computer Science, Physics, Geography, Justus Liebig University Giessen*, <sup>3</sup> *Center for Mind, Brain and Behavior (CMBB), Universities of Marburg, Giessen, and Darmstadt*

Humans are remarkably fast and accurate at detecting faces, even across diverse scene contexts. While scene context is known to influence face detection, the neural mechanisms underlying this effect remain unclear. Here, we investigated how scene previews modulate neural responses during face detection using EEG. A set of 784 scene images containing a single face (left or right) served as target stimuli, with corresponding faceless versions as previews. In an EEG experiment, participants (N=28) saw either a scene preview (preview condition) or a neutral gray screen (no-preview condition) for 250 ms, followed by the target scene. Participants identified whether the scene contained a face (20% foils). Temporal multivariate decoding of neural activity (-100 to 1100 ms) using SVMs revealed higher decoding accuracy of face position (left vs. right) in the no-preview condition between 400–600 ms, suggesting enhanced neural processing of spatial face information without prior scene context. In contrast, time-frequency decoding showed greater accuracy in the preview condition in the alpha (8-13 Hz) band—often associated with top-down processing—highlighting the role of alpha in encoding face position under the influence of scene context. These findings uncover distinct neural mechanisms by which prior scene information influences face detection, with ERP decoding reflecting bottom-up integration processes and alpha activity capturing context-driven attentional enhancement. Our study advances understanding of face perception in naturalistic environments, emphasizing the interplay between scene context and neural dynamics.

**Presentation type:** Original Research Talk

## **Interaction of attentional and learning processes during fear acquisition and reversal**

Ebru Ecem Tavacioglu \*, Mario Reutter , Lea Hildebrandt , Matthias Gamer

*University of Würzburg, Germany*

Threat cues are capable of quickly capturing and maintaining visual attention. The extent to which this attentional bias is indicative of threat characteristics or linked to the prediction of reliable outcomes remains uncertain. Moreover, the process of attentional exploration is shaped by learning, which tends to be selective towards more accurate predictors of an event. In order to explore the interaction of attentional and learning processes during fear acquisition and reversal, we created a novel multiple-cue paradigm. Initially, participants were sequentially presented with single visual cues (threat, safety, and ambiguous), each differing in their predictiveness for an aversive unconditioned electrotactile stimulus. In randomly interspersed multiple-cue displays (ambiguous cues together with either threat or safety cues), we tested whether attentional exploration is biased towards the predictive components of the display or influenced predominantly by the threat value. To investigate the readjustment of expectations, cue-outcome associations were switched between visual cues and aversive outcomes in the second half of the experiment (reversal learning). Shock expectancy ratings and autonomic responses (heart rate, skin conductance) indicated that participants flexibly learned the associations of cues to unconditioned stimuli, but they exhibited a threat-related bias reflecting a better-safe-than-sorry strategy. On the other hand, eye movement data (latency of first fixation, proportional dwell time) revealed that attention is predominantly driven by uncertainty in cues. Reinforcement learning models will be used to map these results. Our research provides insights into how attentional and learning processes interact during fear acquisition and reversal, with implications for understanding threat-related biases in anxiety.

**Keywords:** attention, attentional bias, reversal learning, fear acquisition

**Presentation type:** Original Research Talk



## Neural Correlates of linguistic hierarchical representations

Cosimo Iaia <sup>1</sup>, Alessandro Tavano <sup>1, 2\*</sup>

<sup>1</sup> *Institute of Psychology, Goethe University Frankfurt*, <sup>2</sup>*Department of Cognitive Psychology, Max Planck Institute for Empirical Aesthetics*

Speech tracking may rely on temporal tuning mechanisms that reset low-frequency amplitude modulations of the neural signal to salient changes in the acoustic input. It has been proposed that structure-building operations are also segregated to narrow-band rhythms in the input. To test such a hypothesis, we collected EEG data from 23 Italian native speakers while they listened to two chapters of an audio book in Italian. To control for self-predictability effects of narrowband signals, we adopted a novel information-theoretic approach between sound and EEG envelopes, based on a whitening preprocessing step before computing directional time-lagged dependencies (DIce, Directed Information based on conditional entropy, Daube et al. 2022), and using narrow-band frequency boundaries defined by Highest Density Regions. We find that an HDR-informed approach increases the amount of mutual information extracted from narrowband neural time series. Importantly, we provide strong evidence for polymodality in both speech and structural unit duration distributions, suggesting that they are not segregated into narrowband rhythms, but rather organised into a flexible, polyrhythmic interaction.

Christoph Daube, Joachim Gross, Robin Ince. 2022. A whitening approach for Transfer Entropy permits the application to narrow-band signals. <https://arxiv.org/pdf/2201.02461.pdf>

**Keywords:** Neural tracking, Speech, Language, Mutual Information

**Presentation type:** Original Research Talk

## The Asymmetric List Shift Effect: Selective Practice or Asymmetric Control Adaptation?

Kathrin Treitinger <sup>1\*</sup>, Rico Fischer <sup>2</sup>, Gesine Dreisbach <sup>1</sup>

<sup>1</sup> *University of Regensburg*, <sup>2</sup> *University of Greifswald*

The list-wide proportion congruency effect describes how the congruency effect varies with the frequency of incongruent trials in a list. That is, the congruency effect is larger in mostly congruent (MC) lists than in mostly incongruent (MI) lists. It has been shown that adaptation to these lists does not change symmetrically when transitioning between the lists: moving from MC to MI rapidly

decreases the congruency effect, whereas moving from MI to MC results in little or no increase (Abrahamse et al., 2013). We conducted two studies to replicate this asymmetric list shift effect, using a within-participant design in which all participants experienced both transitions (MC-to-MI and MI-to-MC) within a Stroop paradigm. Although (marginally) significant asymmetric list shift effects were observed, further inspection of the data suggested that practice effects for frequent trial types could explain the findings (see Schmidt, 2016). A third study included frequency-unbiased (i.e., 50% congruent) items embedded in the MC and MI lists, which should not be affected by practice effects. The results showed no significant adaptation between lists for unbiased items and thus no asymmetry, but again selective practice effects for biased items. Taken together, the results suggest that the asymmetric list shift effect is likely to arise from practice effects for frequent trial types rather than from a carryover of task shielding when switching from MI to MC lists.

**Keywords:** cognitive control, control adaptation, proportion congruency, practice

**Presentation type:** Original Research Talk

## Understanding Scene Grammar in Children: Development of Object Representations in Scene Hierarchy

Dilara Deniz Türk <sup>1\*</sup>, Melissa Lê-Hoa Võ <sup>1, 2</sup>

<sup>1</sup> *Goethe University Frankfurt, Department of Psychology, Scene Grammar Lab, Germany,*

<sup>2</sup> *Neuro-Cognitive Psychology, Department of Psychology, Ludwig Maximilian University of Munich, Germany*

Understanding how we represent objects within scenes is fundamental to perceiving and interacting with our world. Scene grammar, a hierarchically structured set of predictions regarding objects and their spatial proximity and functional relationships, plays a crucial role in this process. Objects within a scene are grouped into clusters, or “phrases,” which are organized around anchor objects, predicting the identity and location of other objects within that phrase. Building on prior research conducted with adults in our lab, we set out to investigate the development of object representations in children aged 5-10 years. Using a visual triplet odd-one-out task, we examined how children’s similarity judgments are influenced by scene hierarchy under two task conditions: one where similarity is judged without specific instructions and another where children had to base their judgements on the actions associated with the three objects. Our findings revealed that children rated objects from the same scene as most similar in both conditions. However, phrasal structure did not influence similarity judgments, which were instead driven by the frequency of object pair co-

occurrence. Notably, while the phrasal structure did not affect similarity ratings overall, children's similarity ratings increased for same-phrase objects as they aged. The only difference between task conditions was children rating objects from different scenes as less similar in the action-based task compared to the no-task. In summary, while children are sensitive to scene categories and integrate scene knowledge into their object representations early on, a more fine-grained phrasal structure seems to continue developing as they age.

**Keywords:** Scene knowledge, object representations, object similarity, cognitive development

**Presentation type:** Original Research Talk

## **When Affordance is not Universal: Negative Compatibility Effect Requires Spatial Association**

Nilay Türkan \*, Christian Frings , Lars-Michael Schöpper

*University of Trier*

Research shows that graspable objects trigger motor responses aligned with their orientation, known as the object affordance effect. Vainio et al. (2011) demonstrated that this facilitatory effect is inhibited (negative compatibility effect, NCE) when a compatible prime object is presented shortly before the target. However, task demands strongly modulate how responses are executed (e.g., Schöpper & Frings, 2024). Building on this, we hypothesized that while recent research highlights the role of prime onset, the affordance effect on motor responses also varies with task constraints. In Experiment 1, we tested this hypothesis with three tasks: discrimination of arrow direction, shape discrimination, and circle localization. The time interval between the affordance object (a mug) and target onset (SOAs: 30, 70, 170, 370 ms plus 50 ms blank screen), as well as the compatibility between the mug and response (compatible vs. incompatible), were identical across tasks. In the arrow task, we replicated the standard pattern: participants reacted slower in compatible trials at early SOAs. In contrast, shape discrimination showed no effect, while circle localization revealed a positive compatibility effect (PCE). To explore the PCE in circle localization, we conducted Experiment 2, manipulating the circle's position relative to the central point (near vs. far). In this experiment, we did not find the PCE but replicated NCE for both circle positions. Our results suggest that inhibitory mechanisms influence reactions only for features related to spatial associations. In other words, responses based on shapes without spatial connotations are not affected by this inhibitory process.

**Keywords:** Motor inhibition-facilitation, Affordance, Task dependency, Stimulus–response compatibility

**Presentation type:** Original Research Talk

## **Exploring the Associations of Evidence Accumulation Model Parameters with Socioeconomic Outcomes**

Mischa von Krause <sup>1\*</sup>, Stefan T. Radev <sup>2</sup>

<sup>1</sup> *Heidelberg University*, <sup>2</sup>*Rensselaer Polytechnic Institute*

Evidence accumulation models, such as the diffusion decision model, allow researchers to estimate a set of parameters from empirical response times and accuracy data obtained in binary decision tasks. These parameters can then be used to quantify individual differences. For the drift rate parameter (reflecting evidence accumulation speed), higher parameter estimates seem to be linked to higher intelligence scores. However, cognitive abilities such as general intelligence are known to predict socioeconomic outcomes (e.g., educational attainment, job prestige, income). If drift rates reflect a type of cognitive ability, they should also exhibit similar patterns. We thus studied the associations of evidence accumulation model parameters with several socioeconomic outcomes in a very large sample of online implicit association test data (Project Implicit; N>5,000,000). We found associations between cognitive process model parameters and indicators of socioeconomic success marked by small effect sizes, with some very surprising results regarding drift rate variability. Our results highlight the utility of big data approaches in the field of cognitive modeling that have only recently become practically feasible through novel simulation-based inference methods.

**Keywords:** cognitive modeling, evidence accumulation modeling, socioeconomic outcomes, big data, amortized Bayesian inference, deep learning

**Presentation type:** Original Research Talk

## **Coordination coefficient in social interaction: A pilot study for the object-transport task in a real-life context**

Matthias Weigelt <sup>1\*</sup>, Georgina Török <sup>2</sup>, Jean-Luca Schulz <sup>1</sup>, Yannic Topp <sup>1</sup>, Natalie Sebanz <sup>3</sup>

<sup>1</sup> Paderborn University, Germany, <sup>2</sup> Technical University of Munich, Germany,

<sup>3</sup> Central European University (CEU) Vienna, Austria

In a virtual sequential object-transfer task, Török et al. (2019, Psychological Science) demonstrated that people choose between different paths in a way that ensures the minimization of collective costs. Here, we test this coordination coefficient during social interaction in a real-life context. Thirty participants were asked to carry a ball from a start location on one corner of a 10x10 m square to a goal location in the diagonal corner on the opposite side. The square was divided by a horizontal barrier with two openings to the left and right side of the midline and a vertical barrier of the same or different lengths on either side of the midline. Participants performed alone or in dyads by handing the ball over to another participant at one of the two openings in the horizontal barrier. Because of the different lengths of the vertical barriers, this resulted in congruent conditions, where the short subpath from an individual perspective corresponded to an overall shorter path for the dyad, in incongruent conditions, where the short subpath led to an overall longer path for the dyad, and to neural conditions, where the two overall paths were of equal length. Results showed that participants not only minimized individual costs but also collective costs when performing in dyads, although to a smaller extent (90.8% vs. 82.9% of trials in congruent conditions; 93.1% vs. 73.8% of trials in incongruent conditions). For the object-transfer task, this suggests that people consider shared goals and act coefficiently in a real-life context.

**Keywords:** joint-action, social-motor interaction, social-motor planning

**Presentation type:** Original Research Talk

## **From perception to confidence: Leveraging natural scene statistics**

Rebecca K West <sup>1\*</sup>, Emily J A-Izzeddin <sup>2</sup>, David Sewell <sup>1</sup>, William J Harrison <sup>3</sup>

<sup>1</sup> University of Queensland, <sup>2</sup> University of Giessen, <sup>3</sup> University of the Sunshine Coast

In a noisy perceptual world, confidence judgements play a critical role in humans' ability to make adaptive decisions in the absence of external feedback. Despite their importance, there is currently little consensus on how humans compute their confidence. To advance our understanding of these computations, we investigated the extent to which confidence judgements are informed by prior knowledge. Importantly, unlike previous research, we focused on the role of long-term priors that

are formed through repeated experience with the natural world. Specifically, we used a novel psychophysical paradigm that leveraged the well-characterised probability distributions of low-level image features in natural scenes — distributions known to shape perception. In our task, participants reported the subjective upright of isolated naturalistic image regions (targets) and then reported their confidence in their orientation responses. We used computational modelling to show that participants' perceptual and, importantly, confidence judgements aligned with those predicted by an internalised prior for natural image statistics. Our study highlights the value of naturalistic task designs that capitalise on existing, long-term priors to further understand the computational basis of decision confidence.

**Keywords:** confidence, natural image statistics, metacognition, computational modelling

**Presentation type:** Original Research Talk

## **Role of language comprehension on humanness perception in speech**

Janniek Wester \*, Pauline Larrouy-Maestri

*Department of Music, Max Planck Institute for Empirical Aesthetics, Frankfurt am Main, Germany*

Though the quality of synthetic speech increases, people are still able to identify whether speech is produced by a human or not. In this study, we examine how comprehension enables us to decide on the humanness of the signal. A total of 120 participants, including native German, Spanish and Turkish listeners, evaluated speech samples in terms of “how human the voice sounds to them” in an onsite experiment (for German speakers) and in an online version (for Spanish and Turkish speakers). The speech stimuli were four short German sentences that were then manipulated to obtain three more conditions conveying syntactic but no semantic information (jabberwocky sentences), no syntactic but semantic information (wordlists), and no syntactic or semantic information (jabberwocky wordlists). This material was generated by eight voices from text-to-speech (TTS) tools (Microsoft, Elevenlabs, Murf, and Listnr) and recorded by eight human speakers. Using a linear mixed model approach, we explored the effects of voice category (natural versus synthetic), of syntactic and semantic information, and their interaction with native language, on humanness perception. The results for the German native speakers show that humanness rating of the speech samples was significantly predicted by voice type and the presence of syntax and semantics, with normal sentences rated as sounding more human than the other sentence conditions. Responses of the Spanish and Turkish speaking participants (and the interaction with

other factors) will clarify whether this effect is related to the comprehension of the language or to the prosodic properties of the manipulated conditions.

**Keywords:** TTS, text-to-speech, naturalness, prosody, voice

**Presentation type:** Original Research Talk

## **The fast and the curious: Individual differences in search speed and incidental learning across the lifespan**

Iris Wiegand \*, Isabel Donkers , Joukje M. Oosterman

*Donders Institute for Brain, Cognition and Behaviour, Radboud University, Nijmegen, Netherlands*

Trait curiosity is an intrinsic drive for acquiring knowledge and experience, which motivates learning and exploration. The trait's expression varies between individuals and is known to decline with age. In the present study, we examined how individual differences in trait curiosity and age influence speed and incidental learning in a hybrid visual and memory search task. Hybrid search is akin to many real-world searches and requires the observer to look for multiple, previously memorized, target objects among distractors objects. In three experiments, participants memorized and searched for four targets. Targets were presented in a fixed sequence over search trials in one block (incidental learning condition), and in random order in the other (no-learning condition). We found that effects of trait curiosity on search performance varied with age: Curiosity was linked to incidental learning effects, however, only in young participants who remained unaware of the sequence. By contrast, trait curiosity did not impact search speed in young adults. Conversely, in middle-to-older aged adults, curiosity was unrelated to learning effects, but associated with faster search speed. Furthermore, the effect of curiosity on speed was partially mediated by age. This suggests that age-related decline in curiosity contributes to slower search speed, but also that curiosity may act as a partial buffer against age-related slowing. Together, our results support the notion that trait curiosity can benefit cognition, and that the curiosity-cognition relationship varies with age.

**Keywords:** Hybrid visual and memory search, associative learning, cognitive aging, personality traits, curiosity

**Presentation type:** Original Research Talk

## **Multi negations in information processing**

Robert Wirth <sup>\*</sup>, Yanick Kloß

*University of Würzburg*

Negations, i.e., instructions on what not to do, come with severe challenges for our cognitive system. These include ironic effects, evident in people doing exactly what they are told not to do, increased errors, and significant response time costs for successfully enacted negations when compared to affirmative instructions.

Here, we tested how the cognitive system enacts instructions that include multiple negations, meaning several bits of information have to be negated to select one correct response. We find that negation costs add up, evident by increasing negation costs for increasing negation demands. This suggests that every negation is processed on its own, and additional negations cannot benefit from already ongoing negation processing. Thereby, the processing of negations presents a structural limitation in action control.

**Keywords:** negations, action control

**Presentation type:** Original Research Talk

## **Motivational value biases behavior – not perception**

Christian Wolf <sup>1\*</sup>, Markus Lappe <sup>1</sup>, Hugh Riddell <sup>2</sup>

<sup>1</sup> *Allgemeine Psychologie, Universität Münster, Münster, Germany,*

<sup>2</sup> *Curtin School of Population Health, Curtin University, Perth, Australia*

Whether or not people's motivation can change how they perceive the world has been contested due to methodological pitfalls and mediating factors. We rigorously tested the potential relationship between motivation and perception. In two experiments with healthy adults (N = 80), we manipulated motivational value and measured motivational quality as the difference between self-reported autonomous and controlled motivation. Motivational quality neither influenced behavior nor perception; however, motivational value affected goal-directed eye movement behavior, which in turn determined perceptual sensitivity. Motivational value additionally induced a bias in perceptual reports. By using pursuit eye movements as an implicit measure of motion perception and contrasting it with perceptual reports, we show that this bias only manifested at the response level – and not in perception. We conclude that effects of motivation on perception operate via behavior, thus challenging direct accounts of motivated perception.



**Keywords:** eye movements, perception

**Presentation type:** Original Research Talk

## **The interplay of neural and behavioural filters of attention**

Malte Wöstmann <sup>1, 2\*</sup>, Jonas Obleser <sup>1, 2</sup>

<sup>1</sup> *Department of Psychology, University of Lübeck, Lübeck, Germany,*

<sup>2</sup> *Center of Brain, Behavior and Metabolism, University of Lübeck, Lübeck, Germany*

Goal-oriented behaviour requires selective attention. Attention models rest on the idea that irrelevant inputs are filtered out, but the dynamics of attentional filtering are not entirely clear. I will argue that understanding selective attention deployment in the real world requires to consider humans as active agents, who can act according to their goals to actively shape their sensory environment. I will spell out the functional relevance of two types of attention filters. First, neural filters of attention refer to patterns of brain activity related to target enhancement or distractor suppression. Previously, we found that modulation of lateralized alpha (~10 Hz) oscillatory responses in the human Electroencephalogram (EEG) signify attentional enhancement and suppression. Second, behavioural filters of attention refer to movements of the body or sensory organs to enhance versus reduce sampling of targets versus distractors, respectively. Head rotations to target sound or away from noise constitute a potentially powerful behavioural filter of auditory attention. I will present data of an auditory spatial attention paradigm, wherein participants were allowed to move their head in half of the trials. We used a gyroscope-augmented mobile EEG setup to record neural activity and head rotation. Task performance increased when participants were allowed to move their head. I will demonstrate the close interplay of neural and behavioural filters of attention, which reflects in shared temporal profiles of the two filter mechanisms. Understanding the potential and limits of neural and behavioural filters will extend attention models and enable interventions to support humans to cope with distraction.

**Keywords:** attention, distraction, neural, behavioural, filter, auditory

**Presentation type:** Original Research Talk

## **Cognitive Biases in Decision-Making for Recycled Building Materials: Insights from a Vignette Experiment**

Sophie Würger <sup>1\*</sup>, Annkathrin Sinning <sup>2</sup>, Jan Bielak <sup>2</sup>, Martin Classen <sup>2</sup>, Wei Guo <sup>3</sup>, Wan Li <sup>3</sup>, Torben Miny <sup>3</sup>, Tobias Kleinert <sup>3</sup>, Sabine Schlittmeier <sup>1</sup>, Christian Böffel <sup>1</sup>

<sup>1</sup> *Work and Engineering Psychology, RWTH Aachen University*, <sup>2</sup> *Institute of Structural Concrete, RWTH Aachen University*, <sup>3</sup> *Chair of Information and Automation Systems for Process and Material Technology, RWTH Aachen University*

The construction industry is the largest contributor to global CO<sub>2</sub> emissions, yet the successful adoption of circular construction materials heavily depends on their evaluation by the public. Often, however, consumers lack readily available information on which they can base their decisions. The current study examines how providing information about recycled aggregate concrete (RAC), a new and sustainable construction material, via a Digital Product Passport (DPP) influences the perception and decision-making of potential consumers. A scenario-based vignette experiment (n = 82) was conducted for the use case of a concrete stairway element. The effects of type of concrete aggregates (recycled vs. natural), environmental impact (high vs. low) and durability (high vs. low) on perceived environmental value, perceived functional risk, willingness to pay and product preference were examined. Results showed that all three characteristics significantly affected willingness to pay and product preference. A lower environmental impact increased the perceived environmental value and a higher durability decreased perceived risk. Interestingly, the mere labelling of a material as *recycled* also impacted environmental value and risk perceptions, regardless of the objective environmental and durability characteristics. The findings reveal that consumer decision-making is influenced not only by objective material characteristics but also by biases in information processing, including exaggerated perceptions of environmental benefits and functional risks for recycled material. These insights highlight the importance of addressing cognitive biases and optimizing information presentation in DPPs to enhance informed decision-making and acceptance of sustainable innovations.

**Keywords:** environmental psychology, sustainability, biases and heuristics, judgement and decision making, public acceptance, scenario-based vignette experiment

**Presentation type:** Original Research Talk

## No evidence for learning of invariant responses in contextual cuing

Feifei Zhao <sup>1, 2\*</sup>, Markus Conci <sup>1, 2</sup>

<sup>1</sup> *Department of Psychology, Ludwig-Maximilians-Universität München*, <sup>2</sup> *Graduate School of Systemic Neurosciences, Ludwig-Maximilians-Universität München*

Visual search can be facilitated by learning of statistical regularities, such as when repeatedly encountering a spatial layout of search items that speed the detection of the target (contextual cuing). While contextual cuing is usually thought to improve attentional guidance in finding the target, some studies have also suggested that the benefit for repeated search layouts arises from more efficient response-related processing, after the target has been localized. To test this latter account, the current study systematically varied the difficulty of the required target decision response by varying the number of possible response alternatives (while keeping attentional guidance constant). The results from Experiment 1 showed that contextual cuing was smaller with four than two possible response alternatives, thus indicating that a more difficult response decision actually hampered context-based learning. Moreover, Experiment 2 and 3 showed that even when providing additional, “learnable” (i.e. repeating and thus predictable) response cues did also not enhance contextual cuing, neither with two nor four possible response alternatives. This pattern of results thus suggests that contextual cuing does not facilitate processing after locating a to-be-searched for target, even when additional regularities are provided. On the contrary, the response selection actually appears to interfere with contextual cuing.

**Keywords:** visual attention, visual search, contextual cuing, response selection

**Presentation type:** Original Research Talk

## Dissociating Seeing and Knowing in Time.

Zefan Zheng <sup>1, 2\*</sup>, Darinka Truebutschek <sup>1</sup>, Lucia Melloni <sup>1</sup>

<sup>1</sup> *Research Group Neural Circuits, Consciousness and Cognition, Max Planck Institute for Empirical Aesthetics, Frankfurt am Main, Germany*, <sup>2</sup> *Institute of Psychology, Goethe University of Frankfurt, Germany*

Blindsight research highlights a dissociation between subjective seeing (visibility) and objective knowing (discrimination accuracy), though this phenomenon has been difficult to demonstrate in healthy individuals. We propose a novel temporal approach to examining this dissociation by analyzing the autocorrelation functions of visibility, confidence, and accuracy across 18 existing datasets (N=378). We demonstrate that subjective measures (visibility and confidence) exhibit a robust exponential decay in the autocorrelation function, contrasting with the linear decay observed

in objective accuracy. This dissociation is particularly pronounced for foveal stimuli but absent for parafoveal stimuli, potentially suggesting a retinotopic dependency.

Through meta-analyses and seven contrasts between datasets, we identify the effects of seven experimental parameters—such as response feedback, task duration, and rating scales—on the autocorrelation functions. Simulations suggest these patterns arise from an aperiodic fluctuation in perceptual thresholds with exponentially weighted temporal dependencies.

Our findings provide a highly replicable and generalizable behavioral dissociation between subjective and objective measures of perception, offering a methodological advance for future research on the neural correlates of consciousness (NCC). This work emphasizes the role of temporal dynamics in understanding consciousness and cognition, offering a robust framework for disentangling subjective and objective aspects of perception in healthy populations.

**Keywords:** Consciousness, Visibility, Accuracy, Autocorrelation function, Blindsight

**Presentation type:** Original Research Talk

## **Over-Specification Tests: An Overlooked but Essential Tool to Psychological Theory Development**

Johannes Ziegler \*, Mario Gollwitzer

*LMU München*

In the wake of the replication crisis, scholars have repeatedly argued that one reason for low (and varying) replication rates is that theories and hypotheses are under-specified: most theories do not sufficiently indicate the conditions under which their hypothesized phenomena can or cannot be expected. The proposed remedy for this problem is to search for these conditions systematically and exhaustively – that is, to make a theory or hypothesis more specific. We will argue that the undoubtedly valuable strive to overcome under-specification should be complemented by tackling over-specification. Over-specification characterizes instances of hypotheses or phenomena involving assumptions that could be dropped or replaced by simpler versions without noticeable loss in explanatory power. We will review a series of examples from cognitive and social cognitive psychology (including one original study) to demonstrate the benefits and limitations of this strive for simplification and parsimony. Tackling over-specification proves to be a valuable strategy to gain theoretical insight solidly and efficiently, and to improve cumulativeness, unity, and communicability of evidence and hypotheses.

**Keywords:** over-specification, theory building, hypothesis testing, replicability, consensus building

**Presentation type:** Original Research Talk

## **Decoding Through the Eyes: Blinks as Channels for Expression and Perception in Dyadic Interaction**

Mehtap Çakır \*, Anke Huckauf

*General Psychology, Ulm University*

This study examined the expressive and perceptual functions of eyeblinks and their synchronization during real-time mutual gaze interactions, aiming to elucidate their role in nonverbal communication dynamics. Using dual eye-tracking, we recorded the gaze behavior of 50 participants (25 dyads) engaged in a novel asymmetrical dyadic task designed to isolate gaze-based interactions without verbal cues. In this task, one participant (the listener) was presented with emotion-inducing auditory stimuli and instructed to experience the emotions elicited by them, whereas the other (the observer) attempted to infer the listener's emotional state solely through gaze without hearing the audio stimuli. Blink behavior was analyzed across three consecutive segments: baseline, audio, and silent. Results revealed contrasting effects of the auditory stimuli on blink frequency: in the audio segment, listeners blinked more frequently, while observers blinked less, reflecting task engagement and attentional roles. Furthermore, blink synchronization was significantly reduced during audio segments compared to baseline, suggesting task-driven disruption in shared gaze dynamics. These findings highlight the role of asymmetrical tasks in shaping blink dynamics and interpersonal alignment of blinks. Notably, observers perceived and adapted to changes in the listeners' blink patterns, even without awareness of the transition between segments, underscoring the subtle mechanisms of nonverbal feedback. Taken together, by demonstrating the interplay between task structure and blink dynamics, this study illuminates the expressive and perceptual potential of blinks, contributing to a deeper understanding of gaze-based communication in dyadic social interactions.

**Keywords:** eye contact, mutual gaze, interpersonal synchrony, eyeblink synchronization, eye tracking

**Presentation type:** Original Research Talk

## How Cognitive Load and Emotional Arousal Shape Visual Working Memory: A Study of Top-Down and Bottom-Up Influences

Beril Sercem Şengül <sup>1, 2\*</sup>, Gülin Kaça <sup>1</sup>, Aycan Kapucu <sup>1</sup>

<sup>1</sup> Ege University, <sup>2</sup> Uskudar University

This study, based on Arousal-Biased Competition Theory (Mather & Sutherland, 2011), examined how cognitive load and emotional arousal affect visual working memory for object location. According to the theory, high-arousal stimuli enhance memory performance for prioritized neutral stimuli. Participants recalled the locations of neutral, low-arousal, and high-arousal images under high and low cognitive load conditions. Experiment 1 examined the effects of pairing neutral stimuli with stimuli of varying arousal levels and cognitive load conditions on visual working memory performance during encoding, with top-down processes guiding the target. In Experiment 2, the effects of bottom-up processes on visual working memory for neutral stimuli were investigated. Experiment 3 is examining the effects of pairing neutral stimuli with stimuli of different arousal levels and cognitive load conditions on visual working memory performance when bottom-up perceptual priority is eliminated. The findings showed that participants' response accuracy was higher under low cognitive load than under high cognitive load. Neutral stimuli paired with high-arousal images were more easily remembered than those paired with low-arousal pictures, consistent with the Arousal-Biased Competition Theory. When comparing Experiment 1 (top-down driven) to Experiment 2 (bottom-up driven), there was no significant difference in response accuracy. However, under low cognitive load, the location of neutral stimuli presented with high-arousal pictures was remembered better in the top-down group than in the bottom-up group. Data collection for Experiment 3 is now proceeding. These results indicate that arousal and cognitive load influence visual working memory performance, supporting the Arousal-Biased Competition Theory.

**Keywords:** emotion, arousal, working memory

**Presentation type:** Original Research Talk

## POSTER PRESENTATIONS

---

### Distinct Holistic Processing Mechanisms for Faces and Line Patterns in DNNs

Elaheh Akbari <sup>1, 2\*</sup>, Katharina Dobs <sup>1, 2</sup>

<sup>1</sup> *Department of Psychology, Justus Liebig University Giessen, Giessen, Germany,* <sup>2</sup> *Center for Mind, Brain and Behavior, Universities of Marburg, Giessen, and Darmstadt, Marburg, Germany*

Holistic processing refers to the human tendency to perceive objects as unified wholes rather than as separate, independent parts. A key measure of holistic processing is the composite effect, where the top half of one object (e.g., a face) is combined with the bottom half of a different object, leading to the perception of a unified, novel whole—an illusion that disappears when the combined parts are laterally shifted (misaligned). Traditionally, holistic processing has been viewed as specific to faces or objects of expertise. However, recent evidence suggests that line patterns can also be processed holistically without prior training, raising the question: Do these two types of holistic processing rely on similar or distinct processing mechanisms? Here, we used deep neural networks (DNNs) to address this question. We trained three VGG16-based DNNs on object identification, face identification, or both tasks and measured the size of the composite effect using face and non-face line pattern stimuli, analogous to those used in human studies. Preliminary results revealed that holistic processing of faces occurred only in DNNs trained specifically on face identification, supporting a face-specific mechanism. In contrast, we found a composite effect for line patterns across all trained DNNs, suggesting a domain-general effect. Furthermore, holistic processing for faces emerged in later classifier layers, whereas it was evident in earlier feature extraction layers for line pattern stimuli. Our results suggest distinct mechanisms underlying holistic processing for faces and non-face stimuli in ANNs, and, we conjecture, also in human brains.

**Keywords:** holistic processing, face perception, deep neural networks, visual perception

**Presentation type:** Poster Presentation

## **Relational memory for object changes in scenes: Eye movements reveal effects of scene repetitions**

Josefine Albert <sup>1, 2\*</sup>, Werner X. Schneider <sup>1, 2</sup>, Christian H. Poth <sup>1, 2</sup>

<sup>1</sup> *Neuro-Cognitive Psychology, Bielefeld University*, <sup>2</sup> *Center for Cognitive Interaction Technology, Bielefeld University*

When a scene changes between viewing instances, humans make relatively more fixations to, dwell longer on, and make more transitions in and out of the altered object's area. This is typically shown as differences between novel, repeated, and manipulated scenes. Here, we explored whether not only the existence but also the extent of learning history prior the scene change affected viewing behavior. Experiment 1 adapted a paradigm by Ryan et al. (2000) to establish the memory effects with computer-generated scenes and high-resolution eye-tracking. Subjects viewed a set of scenes for a later memory test. Scenes were repeated, manipulated (object shifting or addition/deletion), or novel. Implicit relational memory became visible for shifting in all and for additions in most measures. In Experiment 2, we varied the extent of learning by repeating the scenes 1, 2, 4, or 8 times before introducing the manipulation. Based on the first experiment's results, all scenes underwent a shifting manipulation. We calculated the difference in the critical object's viewing parameters between the presentation before the change and the change presentation. The number of repetitions had a significant effect. Participants increased their dwell time, fixation proportion, and number of transitions more when they had viewed the scene for 4 or 8 times than for 1 or 2 times. Eye movement measures correlated with participants' explicit memory between .37 and .51, yet not significantly. Thus, the investigated eye movement measures may capture memory strength rather than memory presence alone, but their suitability for memory strength assessment is discussed.

**Keywords:** memory, relational memory, eye movements, scenes, attention, change detection, learning

**Presentation type:** Poster Presentation

---

## **Auditory attention and distraction in autism**

Lejla Alikadic <sup>\*</sup>, Jan Philipp Röer

*Witten/Herdecke University, Witten, Germany*

This poster presents findings from three experiments on auditory attention and distraction in autism. Although it has been known for a long time that autistic and neurotypical individuals differ in the



processing of auditory information, the specifics and underlying causes for these differences are still unclear. To contribute to a more comprehensive understanding, we explored how autistic and neurotypical individuals process and respond to irrelevant auditory information using three different well-established experimental designs. In Experiment 1, we focused on three classic types of auditory distractor sequences, (1) steady state sequences, (2) changing state sequences, and (3) auditory deviant sequences. In Experiment 2, we were interested in the disruptive effect of single-channel and multi-talker speech and that of distractor intensity. In Experiment 3, we looked at shadowing errors and name detection in the irrelevant message during a selective listening task. Overall, we found that autistic and neurotypical individuals are surprisingly similar in how they process and respond to irrelevant auditory information. Auditory attention and distraction was also not related to individual differences in the autism spectrum quotient in all three experiments. The data and materials from all three experiments are publicly available. We look forward to seeing you at our poster.

**Keywords:** Auditory Distraction, ASD, Autism, Working Memory, Habituation

**Presentation type:** Poster Presentation

---

## Modeling Human Spatiotemporal Prediction Ability with Feedforward and Recurrent Neural Networks.

Nisa Alo <sup>2\*</sup>, Giuliana Giorjani <sup>1</sup>, Rosanne Rademaker <sup>1</sup>

<sup>1</sup> *Ernst Strüngmann Institute for Neuroscience in cooperation with the Max Planck Society*, <sup>2</sup>  
*Interdisciplinary Center for Neuroscience Frankfurt, Goethe University*

Motion extrapolation is the ability to predict an object's future location from its past locations along a dynamic trajectory. Behavioral and neural findings show that motion extrapolation occurs across different time scales, from possibly compensating for neural transmission delays within the visual system (milliseconds) to guiding goal-oriented behavior, such as in target interception (seconds). Here, we focus on investigating how spatiotemporal predictions for the longer time scales used in human cognitive processing rely on different neural computations, and how accumulated information from an object's past locations supports spatiotemporal predictions. We trained two types of models (feedforward and recurrent neural networks) to predict different trajectory lengths over different input lengths using a novel synthetic dataset. Prediction accuracies from both models increased with increasing input length. Yet, the recurrent model showed more consistent performance across input lengths than the feedforward model. Next, we had 21 participants perform

a motion extrapolation task and predict the location of a moving target under occlusion across different occlusion durations. Participant's performance decreased with longer occlusion periods. We then compared human and network model performance in the same task. Both network models underperformed relative to humans. Together, these results suggest that spatiotemporal information integrated over an increasing number of past time points yields more robust spatiotemporal predictions, and that long-range spatiotemporal predictions might benefit from a recurrent memory component. Nevertheless, feedforward and recurrent computations alone failed to replicate motion extrapolation at the level of human participants, indicating that more complex computations are required to match human performance.

**Presentation type:** Poster Presentation

---

## Effects of Moral Orientation on Fusion with the Group and Member Valuation

Rico Alokuzay \*, Laura Blümel , Yannick Cezanne , Martin Schultze , Sabine Windmann  
*Cognitive Psychology II, Goethe University Frankfurt*

People tend to align their moral judgments with the majority opinion of the group to which they feel they belong. According to studies by Bostyn and Roets (2017), this tendency is stronger for deontological than for utilitarian judgments. Across three experiments (total N=702), we were unable to replicate this asymmetric effect. However, consistent with a recent finding by the same group of authors using the trust game (Bostyn et al., 2023), we found that people value their ingroup more highly when the majority vote of this group is consistent with their own ("homegrown") moral orientation as assessed by the Oxford Utilitarianism Scale. This morally grounded ingroup favoritism was evidenced by higher perceived fusion of self with the group on a continuous pictorial fusion scale as well as more positive ratings of members of the ingroup on an adjective checklist. The effect was essentially the same for real-life dilemmas selected from Körner and Deutsch (2023) relative to the typically used hypothetical dilemmas, with no significant differences between dilemma types (N=439). Future research will need to investigate whether the tendency to favor a like-minded group is specific to moral decision making, or may be a manifestation of a more general self-confirmation bias.

**Keywords:** Utilitarianism, Deontological, moral judgment, moral orientation, person-situation interaction, inclusion of others in self (IOS), fusion with the group

**Presentation type:** Poster Presentation

---

## **Exploring Individual Differences in Face Recognition: The Impact of Holistic Processing and Eye Movement Strategies**

Sonia Amado <sup>1\*</sup>, Aycan Kapucu <sup>1</sup>, Elif Yüvrük <sup>2</sup>, Ayşegül Aydınlık <sup>1</sup>, Belkıs Durmuş <sup>1</sup>, Murat Karataş <sup>3</sup>, Büşra Batır <sup>1</sup>

<sup>1</sup> *Ege University, Department of Psychology*, <sup>2</sup> *Muğla S?tk? Koçman University, Department of Psychology*, <sup>3</sup> *Bursa Technical University, Department of Psychology*

Our study aimed to explore the relationship between face processing patterns and individual differences in face recognition ability using tasks designed to impair holistic face processing. Face recognition performance, influenced by holistic processing strategies, was assessed in 206 participants (aged 18–63, including 26 super-recognizers and 17 individuals with developmental prosopagnosia) through inversion, composite, and part-whole tasks. Eye movement patterns were recorded alongside behavioral data to provide additional insights. Participants' holistic face processing indexes were calculated using subtraction and regression methods for each of these tasks. Face recognition performance was evaluated using CFMT+, EGEFACE (a new test using dynamic faces), and KFMT. We observed that as face processing ability increased, reliance on holistic processing measured via residual scores of part-whole, composite and inversion tasks increased. A moderating effect was found in terms of accuracy and reaction time in the inversion and composite face tasks. Eye movement data are analyzed in relation to face processing strategies, fixation duration, saccadic movements, and preferred fixation locations on the face, examining their connection to the holistic face processing index and face recognition ability across various face memory and perception tests.

**Keywords:** Holistic processing, eye movements, face memory, individual differences

**Presentation type:** Poster Presentation

## **An analysis of the unconscious processing of hierarchical patterns through Bayesian and General Recognition Theory models**

Christian Andrade <sup>1\*</sup>, Antonio Prieto <sup>2</sup>, Pedro R. Montoro <sup>2</sup>, Mikel Jiménez <sup>3</sup>, José Antonio Hinojosa <sup>1</sup>,

4

<sup>1</sup> *Complutense University of Madrid*, <sup>2</sup> *National University of Distance Education*, <sup>3</sup> *Durham University*, <sup>4</sup> *Nebrija University*

Consciousness research has been plagued by a lack of conceptual clarity and confusion between types of data and measures, which affects the effects found, so that it is not uncommon to find conflicting effects for the same phenomenon. Therefore, it is essential to develop methodologies that address these problems and experimental designs that allow for the collection of the necessary data to apply them. In this area, visual perception, and in particular perceptual grouping, has been in the spotlight, with the question of whether local forms group into global forms in the absence of awareness, with various effects being found. To investigate these grouping effects in the absence of awareness, the present study examines whether a masked stimulus is processed unconsciously by combining different designs of a masked priming paradigm and both objective and subjective measures of awareness collected in separate blocks (offline measures) or trial-by-trial (online measures). Two novel methods are used to investigate whether primes are processed unconsciously or not: a correction of Greenwald's regression using a Bayesian generative model, and sensitivity versus awareness curves based on general recognition theory. Both methods avoid the post hoc selection of subjects and trials and account for several methodological problems such as regression to the mean, which can lead to misinterpretation of the results. Our results indicate a certain dependence between perceptual processing and level of awareness. Interestingly, the use of different paradigms to assess unconscious processing and the resulting theoretical assumptions may lead to somewhat divergent results.

**Keywords:** Consciousness, Regression to the mean, Masked priming paradigm, Perceptual processing, Awareness, Methodology

**Presentation type:** Poster Presentation

## **How Emotions Differentiated by the Source of Threat Affect Decision-Making in the Balloon Analog Risk Task: Differential Effects of Angry versus Fearful Expressions**

Elif Sivri , Elvan Arian İyilikci \*

*Ege University, Department of Psychology, Experimental Psychology*

Facial expressions may have different effects on cognitive processes: A fearful expression may divert attention to the context, signaling the existence of a potential threat, whereas an angry face, as a source of the threat, may attract the observer's attention (Williams et al., 2005). Several studies have provided supporting evidence that fearful facial expressions enhance early-level visual perception by increasing contrast sensitivity (e.g., Phelps et al., 2006), facilitate memory for contextual components (e.g., Davis et al., 2011), and improve efficient visual search for target objects (e.g., Becker, 2009). Building on these findings, this study aims to examine the effects of different facial expressions on a different domain, namely, risk-taking behavior, using the Balloon Analog Risk Task (BART; Lejuez et al., 2002). In two experiments (Experiment 1: between-subjects design; Experiment 2: within-subjects design), participants were shown a facial expression (an angry, fearful, or neutral face) before each trial in the BART. It was hypothesized that exposure to fearful facial expressions (which may serve as a cue for a potential threat, i.e., balloon explosion) would decrease risk-taking behavior compared to the other conditions. Overall, risk-taking trends were in the expected direction: Participants in the angry expression condition tended to take more risks, while those in the fearful expression condition showed a tendency to avoid risks, suggesting that facial expressions with different communicative values have the potential to affect decision-making processes as well. The findings were discussed in the frame of different theoretical approaches to emotion, and suggestions for future research were provided.

**Keywords:** emotion, facial expression, risk taking, Balloon Analog Risk Task

**Presentation type:** Poster Presentation

## **Perception of self-generated tactile stimuli is enhanced independent of spatial alignment between action and sensation**

Belkis Ezgi Arikan <sup>1, 2, 3\*</sup>, Katja Fiehler <sup>2, 3</sup>

<sup>1</sup> *University Hospital Essen, Clinical Neurosciences*, <sup>2</sup> *Justus Liebig University Giessen, Department of Psychology*, <sup>3</sup> *Center for Mind, Brain and Behavior*

Sensory stimuli generated by voluntary actions are perceived as weaker than those generated externally. This phenomenon is explained by internal forward models, where an efference copy of the motor command predicts the sensory consequences of an action and attenuates perception when the prediction matches the actual sensation. Spatial alignment between the action and the resulting sensation is found to play a critical role, with previous research showing stronger tactile suppression at locations spatially aligned with the movement compared to more distant locations. However, these studies did not control for the predictability of spatial alignment, i.e., when spatial separation is reliably expected, leaving the role of motor prediction unclear. Here we investigated whether predictable spatial separation between the moving effector and the resulting sensation leads to attenuation. Participants discriminated between two tactile vibrations, the first of which was self-generated via a button press. The vibrations were produced either by the right index or little finger, while the tactile stimulation was felt on the left index or little finger. In a rest condition, participants discriminated the same stimuli without performing a movement. We found tactile enhancement rather than attenuation across all conditions compared to when stimuli were presented at rest, regardless of spatial alignment between the moving finger and the stimulated finger. These findings indicate that spatial alignment may not be a necessary condition for the differential processing of self-generated tactile stimuli. Instead, the ability to flexibly form motor predictions for various action-sensation events may better reflect the demands of real-world contexts.

**Keywords:** tactile attenuation, spatial, internal models, motor prediction

**Presentation type:** Poster Presentation

## Motor Skills Contribute to the Development of Mental Rotation from Infancy to Preschool Age

Tharanirakshita Asokan <sup>1, 2\*</sup>, Bianca Jovanovic <sup>1, 2</sup>, Gudrun Schwarzer <sup>1, 2</sup>

<sup>1</sup> Department of Developmental Psychology, Justus Liebig University Giessen, Germany, <sup>2</sup> Center for Mind, Brain and Behavior (CMBB), University of Marburg, Giessen and Darmstadt, Germany

Mental rotation (MR), a hallmark of spatial intelligence, predicts later academic success (Wai et al., 2009). Although cross-sectional studies have explored MR in infancy and preschool age, its developmental trajectory and the influence of self-produced locomotion remain underexplored. In this longitudinal study, we tested 24 children at 9-months (T1) and 4–6 years (T2). At T1, crawling and non-crawling infants were assessed for MR using a habituation paradigm with Shepard-Metzler objects (Gerhard et al., 2021). At T2, children participated in an age-adjusted MR task consisting of 10 trials with a rotating Shepard-Metzler object video (0°–119°) on the left and paired static images mirrored to each other (120°–359°) on the right. The task was to identify the static image that resembles the object on the left. The first 5 trials included feedback, while the rest were without feedback. Motor skills were assessed using the LoMo (3-6) (Jaščenoka & Petermann, 2018). Results revealed a positive correlation between MR performance at T1 and T2 ( $r(20) = .420, p < .05$ ). The correlation was stronger for without feedback trials ( $r(21) = .649, p < .001$ ), suggesting a stable developmental trajectory. LoMo-Scores correlated positively with MR performance at T2, ( $r(21) = .429, p = .046$ ). Crawling status predicted without feedback accuracy at T2, ( $r(21) = .410, p = .05$ ), indicating that self-produced locomotion contributes to MR development into preschool age. These findings have implications for education, where improved MR can lead to stronger STEM performance and motor skills could be driving factors.

**Keywords:** mental rotation, motor skills, visual-spatial processing, longitudinal study, crawling status

**Presentation type:** Poster Presentation

## Balancing Autonomy and Automation: Meaningful User Experience in Smart Charging Agent Interactions

Christiane Attig <sup>1\*</sup>, Simon Flintrop <sup>1</sup>, Christiane Wiebel-Herboth <sup>2</sup>, Thomas Franke <sup>1</sup>

<sup>1</sup> University of Lübeck, <sup>2</sup> Honda Research Institute Europe GmbH

Everyday life is increasingly permeated by interactions between humans and autonomous agents. One example is electric vehicle (EV) drivers using smart charging agents (SCA) based on automated information processing to manage limited interdependent resources (e.g., availability of electrical energy, charging times). These agents must not only manage resources effectively, but also ensure meaningful participation in charging decisions, thereby supporting user autonomy – a fundamental psychological need according to self-determination theory. Understanding how autonomy is maintained or diminished in these interactions is a key cornerstone for optimizing the balance between automation and human decision making in shared resource contexts.

Using a 2x3 mixed-subjects design and a vignette-based approach, N = 70 participants (planned sample size) with EV experience engaged with scenarios simulating interaction with an SCA that calculated charging stops for a long-distance trip. As independent variables, we first varied user autonomy (no autonomy, medium and high autonomy) by giving participants different levels of control over the resulting trip plan. Second, we varied the amount of information (low, high) provided to explain the agent's trip planning decisions. As dependent variables, we assessed participants' perceived autonomy need satisfaction as well as user experience variables (i.e., perceived agent cooperativeness, teaming perception, subjective information processing awareness). We hypothesize that user experience and need satisfaction will be higher with more user autonomy and information provided. The results can be used for human-centered design of SCA interactions aiming at meaningful interactions.

**Keywords:** human-AI teaming, human-autonomy teaming, human-AI interaction, psychological basic needs, autonomy

**Presentation type:** Poster Presentation



## Physical Effort, Decision Conflict and Cognitive Offloading

Rouven Aust \*

*Julius-Maximilians-University of Wuerzburg*

Cognitive Offloading is defined as the use of external resources to minimize cognitive demand. Although this definition implies an additional action and therefore physical effort to be exerted, the influence of such physical effort on Cognitive Offloading Behaviour has not or only insufficiently been investigated. Through a custom-designed electromagnetic rotation knob a varying resistance was made possible to investigate the influences of physical effort on decision making in the context of Cognitive Offloading. This also allowed for hand motion tracking (as is done in a typical mouse tracking setup) to achieve a deeper understanding of the influence of physical effort on the decision making process.

An extension of the mental rotation paradigm is used to either rotate a working stimulus mentally or manually. As a manipulation of effort the rotation knobs' resistance (physical) and the presentation angle of the working stimulus (mental) were varied. Confounds of physical effort with time were eliminated.

Participants use the option to offload the rotation process to the knob more often when the physical effort it takes to do so is low. There is evidence that physical effort is taken into account as part of a value based decision making process. The time individuals took to initiate a hand movement does reveal that for the high physical effort condition individuals experience greater decision conflict. The paradigm used here can replicate common findings of the field as well as add new and promising insights into the decision making process when it comes to Cognitive Offloading.

**Keywords:** Cognitive Offloading, Physical / Mental Effort, Decision-Making

**Presentation type:** Poster Presentation

## Contribution of acoustic and perceptual features in predicting a “music” category

Talip Ata Aydin \*, Melanie Wald-Fuhrmann , Pauline Larrouy-Maestri

*Music Department, Max-Planck-Institute for Empirical Aesthetics, Frankfurt-am-Main, Germany*

Individuals consistently identify certain sounds as music but not others (Larrouy-Maestri & Wald-Fuhrmann, pre-registration). In this study, we investigate what grounds a “music” category. To do so, 98 online participants were asked to rate the 90 stimuli selected from various databases on a slider (0: not music – 100: music), which were then clustered into three categories corresponding to music, ambiguous, and non-music stimuli. Each stimulus was described in terms of its acoustic and perceptual characteristics. The acoustic features (n = 252) were extracted with the Essentia toolbox. The perceptual characteristics were rated by participants on ten scales, focusing on aspects such as repetition, intentionality, instrumentality, complexity, melody, rhythm, tempo, pulse, harmony, and timbre. In essence, these perceptual characteristics reflect how listeners interpret the acoustic information. We first reduced both sets of features (acoustic and perceptual) into two meaningful dimensions through principal component analysis and used them as predictors of the three categories (i.e., non-music, ambiguous, and music stimuli) in two separate models. The perceptual model outperformed the acoustic one, supporting the significant role of human interpretation of acoustic characteristics over the acoustic properties themselves in shaping listeners' perception of music.

Larrouy-Maestri, P., & Wald-Fuhrmann, M. (Pre-registrations OSF, 2022-2023). <https://osf.io/sb24q> , <https://osf.io/azkcp> , <https://osf.io/re7dq>

**Keywords:** music perception, categorization, acoustics, perceptual features

**Presentation type:** Poster Presentation

## **Intra-individual variability in TVA's visual attention capacity and weight distribution**

Ngoc Chi Banh \*

*Paderborn University*

Individual-level analyses are gaining increasing attention in recent psychological research. Historically, cognitive psychology has predominantly followed a nomothetic approach. Our work emphasizes the need for a more idiographic perspective in cognitive research, highlighting the importance of understanding variability within individuals.

This poster presents a re-analysis of the dataset by Tünnermann and Scharlau (2021) to investigate intra-individual variability in visual attention capacity, as formalized in the Theory of Visual Attention (TVA). The dataset comprises seven participants, each providing between 10,000 and 20,000 temporal-order judgments across multiple sessions over several days. Using Bayesian analysis, we examined trends in variability and the stability of overall processing capacity and orientation saliency within individuals. While some participants demonstrated learning effects across sessions, others maintained relatively stable overall processing capacities, fluctuating around a consistent value. Orientation saliency showed diverse patterns across participants. In some cases, it was a stable effect, consistently shifting the weight toward the salient probe, as expected from previous studies. In others, it affected the distribution of attentional resources depending on the number of days participants were involved. For some individuals, saliency fluctuated considerably, and in certain instances, the saliency effect was entirely absent. Additionally, we conducted an experiment to assess within-day variability, systematically accounting for time-of-day influences on visual processing performance.

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

**Presentation type:** Poster Presentation

## **A matter of confidence? A closer look at how social interactions enhance and distort subsequent individual recognition judgments**

Johannes Bartl \*, Magdalena Abel

*Department Arts and Science, Cognitive Psychology Lab University of Technology Nuremberg,*

Social interactions can shape our memories. The collaborative recognition task is completed in groups of three and consists of three phases. In an individual study phase, some materials are encoded by all participants, some by two participants, and some by single participants only. Then, an interpolated memory test on all studied information is taken either individually – or collaboratively, together with the other group members. Finally, an old/new recognition test on all studied information is completed individually by all participants. Here, it is typically found that prior collaboration enhances old judgments for information initially studied by all group members, but also distorts memory such that information initially studied by other group members only is also more likely to be incorrectly judged as old. It is unclear, however, if these effects of prior collaboration reflect real shifts in memory or can be explained via differences in guessing. Going beyond prior work, in a new experiment, participants provided confidence judgments at final test, allowing examination of ROC curves. Analyses based on the unequal variance signal detection model suggested that prior social interactions increased memory strength (captured by parameter  $d_a$ ) for initially studied information as well as for information studied by other group members only. Analyses at the group level moreover showed that prior collaboration enhanced mnemonic overlap regarding what specific contents were remembered across group members. Overlap in confidence judgments was centered around high confidence old responses. Overall, the observed effects of social interactions seem to reflect real differences in memory.

**Keywords:** Social contagion, Collaboration, False memory, Collective memory

**Presentation type:** Poster Presentation

## Violations of spatiotemporal visual regularities lead to pupil dilation responses

Hamit Basgol <sup>1, 2\*</sup>, Florian Raab <sup>1, 2</sup>, Peter Dayan <sup>1, 3</sup>, Volker H. Franz <sup>1</sup>

<sup>1</sup> *Department of Computer Science, University of Tübingen, Tübingen, Germany,* <sup>2</sup> *The Graduate Training Centre of Neuroscience, University of Tübingen, Tübingen, Germany,* <sup>3</sup> *Max Planck Institute for Biological Cybernetics, Tübingen, Germany*

Humans form models of statistical regularities in sensory stimuli and make predictions from them. For example, participants expect regular patterns of auditory tones to continue, and generate phasic arousal and pupil dilation responses (PDRs) when such expectations are violated (Zhao et al., Nature Communications, 2019; Basgol, Cortex, 2024). In the current study, we conducted two experiments to examine whether these findings can be generalized to spatiotemporal visual patterns involving regular and random patterns of white dots appearing at different locations on a grid. In the first experiment (N=14), we used (a) transitions from a regular pattern to a random or another regular pattern (both violating the earlier regularity) or (b) transitions from a random to a regular pattern (realizing a new regularity). Participants were instructed to find blanks in patterns so they had to keep paying attention. In the second experiment (N=19), we used only regularity violations (condition (a)), and instructed participants to report if the white dot changed shape. We observed that violations, but not the emergence, of visual regularities evoked PDRs. Further analysis indicated that the dissimilarity between regularities before and after the transition was associated with their magnitudes.

**Keywords:** visual regularity violations, statistical regularities, pupil dilation responses, arousal

**Presentation type:** Poster Presentation

## **Small, non-stationary, and hidden objects are often underrepresented in large-scale scene databases**

Feron Y. Basoeki <sup>1\*</sup>, Sandro L. Wiesmann <sup>1</sup>, Melissa L.-H. Võ <sup>1, 2</sup>

<sup>1</sup> *Goethe University Frankfurt, Department of Psychology, Scene Grammar Lab, Germany,* <sup>2</sup> *Neuro-Cognitive Psychology, Department of Psychology, LMU Munich*

Objects play a crucial role in our ability to categorize scenes. Two object properties are particularly important for predicting scene categorization accuracy: Object frequency and specificity for the given scene category. These object-occurrence statistics are often estimated from large-scale databases of labelled scene images. However, database measures do not always correlate with human ratings of specificity and frequency, opening up the question which of the two – databases or human ratings – better represent object-occurrence statistics in the real world. Here we therefore compared object frequency and specificity estimates gathered from human ratings (6-point Likert scale), scene image databases versus real-world environments (i.e., accurate object counts). Participants (N = 91) were asked to report the presence and number of 79 pre-selected objects in different rooms of their homes and rate their visibility and usage frequency. Intriguingly, while specificity measures were relatively consistent across participants' self-reports and scene databases, we found significant differences between self-reports and databases with regard to object frequency. Especially smaller, non-stationary objects such as consumable goods (e.g., shampoo) and objects that are usually "hidden" or stored away (e.g., dishes or detergent) were underrepresented in scene image databases. Nonetheless, averaged human-rated object-occurrence statistics still outperformed both real-world and database statistics in predicting scene categorization accuracy, suggesting that scene categorization is based on prototypical object representations rather than real-world occurrence statistics. We therefore suggest considering the suitability of each source of object-occurrence statistics depending on the researchers' goal and argue for more realistic and representative real-world scene image databases.

**Keywords:** scene categorization, object-occurrence, scene databases, object frequency

**Presentation type:** Poster Presentation

## **The effects of perceptual and conceptual evaluations on face recognition performance in terms of holistic processing**

Büşra Batır <sup>1\*</sup>, Sonia Amado <sup>2</sup>

<sup>1</sup> *Ege University*, <sup>2</sup> *Ege University*

Perceptual and conceptual evaluations made during the process of new faces becoming familiar faces are important determinants of face recognition performance. The literature shows that evaluated conceptually are better remembered compared to those evaluated perceptually. However, it has not been sufficiently considered before that faces are special stimuli. One of the most fundamental findings regarding face perception is that faces are processed holistically unlike other visual stimuli. This study examines the effects of perceptual and conceptual evaluations made during the learning of faces on face recognition performance from a holistic processing perspective. In the learning phase, participants were asked to evaluate half of the faces based on conceptual (trustworthiness) and the other half based on perceptual (face roundness) characteristics (Experiment 1). In the recognition test, an inversion manipulation was applied to examine whether the expected effect related to the type of evaluation originated from holistic processing. In Experiment 2, perceptual and conceptual evaluations were compared among themselves regarding the use of holistic processing strategies, so conceptual (trustworthiness, dominance) and perceptual (face roundness, mouth width) evaluations were diversified. Results replicated the finding that conceptual evaluations lead to better recognition performance than perceptual evaluations. Importantly, the inversion effect was greater for conceptually evaluated faces than for perceptually, suggesting that the holistic processing strategy is used more during conceptual evaluations than perceptual evaluations. Furthermore, the results of Experiment 2 suggest that perceptual evaluations differ among themselves in terms of the contribution of holistic processing contrary to conceptual evaluations.

**Keywords:** face recognition, perceptual evaluation, conceptual evaluation, holistic processing, inversion effect

**Presentation type:** Poster Presentation

## **Plasticity of interference effects on n-2 repetition costs in task switching**

Alexander Berger <sup>\*</sup>, Markus Kiefer

*Ulm University, Department of Psychology, 89075 Ulm*

There is a debate regarding the processes contributing to n-2 repetition costs in task switching, which are thought to reflect an inhibition of task sets. N-2 repetition costs are assessed when switching between three tasks and are defined as a worse performance if the task was repeated from trial n-2 to trial n (sequence ABA) compared to when the task switched from trial n-2 to trial n (sequence CBA). Research showed that besides inhibitory mechanisms, also episodic interference effects acting on the level of a task or stimulus episode contribute to n-2 repetition costs. By manipulating whether participants have to process repeated vs. unrepeated stimuli, with the latter one being never encountered before, we aimed to further investigate the contribution of interference effects to n-2 repetition costs. As interference effects are likely to increase with prolonged experimental duration, i.e., when more episodes of the same stimulus have been processed, we also examined how n-2 repetition costs changed with practice. In this experiment – in contrast to previous task switching studies – n-2 repetition costs increased after prolonged practice. Furthermore, they were more pronounced when stimuli were repeated. This highlights the importance of interference effects between stimulus episodes for n-2 repetition costs, with this interference increasing with the number of previously encountered stimulus episodes. This suggests that the mechanisms contributing to n-2 repetition costs depend on the experimental context and practice.

**Keywords:** task switching, n-2 repetition costs, practice effects, interference, cognitive control

**Presentation type:** Poster Presentation

---

## **The influence of circadian rhythm on operant conditioning in planaria**

Nele Berner <sup>\*</sup>, Jannes Freiberg

*Kiel University*

Non-parasitic freshwater flatworms, planarians such as *G. tigrina*, serve as a model organism mainly due to their extraordinary regenerative capacity; moreover, their simple but centralized nervous system together with limited behavioral responses enable an almost isolated study of learning and memory in contrast to the black box of human cognition. In a large number of studies



associative learning such as classical conditioning and operant conditioning has already been observed in planarians. In more recent times it has also been shown that planarians sleep, in the sense of a circadian organized quiescence, which raises the question of the connection between sleep and learning in planarians, a relationship which is well known in humans and even other invertebrates but has been overlooked by most studies on associative learning in planarians in the past. In an initial study we manipulated the day-night-rhythm, measured quiescence and the impact of subjective daytime on short term memory and a 24h long term memory within a newly established operant conditioning paradigm, the water droplet paradigm. In a follow-up study we replicated the basic procedure of the first study, additionally considering different common nocturnal simulation techniques. These consisted of redlight, infrared light and absence of light, which have been shown to elicit different behavioral responses in planarians. This allowed us to investigate possible differences in sleep-induced quiescence and learning ability. The results show that manipulation of the activity-cycle of the planarians is possible, and that the circadian rhythm is an important factor in planarian learning.

**Keywords:** basal cognition, planaria, operant conditioning

**Presentation type:** Poster Presentation

---

## **Do older adults show differences in the initial processing of coherent vs. non-coherent motion stimuli compared with younger adults? An event-related potential (ERP) study**

Stefan Berti <sup>1\*</sup>, Brandy Murovec <sup>2,3</sup>, Julia Spaniol <sup>3</sup>, Behrang Keshavarz <sup>2,3</sup>

<sup>1</sup> *Institute for Psychology, Johannes Gutenberg-University of Mainz, Mainz, Germany,* <sup>2</sup> *KITE Research Institute, Toronto Rehabilitation Institute- University Health Network, Toronto, Canada,* <sup>3</sup> *Department of Psychology, Toronto Metropolitan University, Toronto, Canada*

Coherent motion stimuli can trigger the sensation of self-motion in a stationary observer. Recent studies suggest that this phenomenon, called vection, shows some effect of age. Here, we focus on the question whether the sensory processing of visual motion, which can trigger vection, also exhibit age-related differences. To this end, we compared event-related potentials (ERPs) in older adults (N = 25; age range: 65-83) and younger adults (N = 22; 20-35 years) in two conditions: participants observed optokinetic stimuli either constituting a coherent or a non-coherent motion stimulus. ERPs

time-locked to the motion onset of the optokinetic stimuli revealed differences between coherent and non-coherent motion at parietal-occipital electrodes around 100-150 ms (P1) and 150-230 ms (P2). However, ERPs showed no significant age differences. Further, in a separate rating block, participants reported that vection was significantly stronger following coherent vs. non-coherent; again, no age effect was found. Taken together, our results suggest relative age-related stability in the subjective experience and neurophysiological basis of visually induced vection.

**Keywords:** Age-differences, vection, vision, event-related brain potentials (ERP), sensory processing

**Presentation type:** Poster Presentation

---

## **Exploring Self-Reported Helping, Punishment, and Moral Courage Within and Across Group Boundaries: Implications for the Inclusion of Others in Self Scale**

Lucie Binder <sup>\*</sup>, Martin Schultze , Sonja Langenstein , Sabine Windmann  
*Goethe University Frankfurt*

Altruistic motivation may not be unidimensional, but may drive dissociable patterns of behavior. Across two experiments, we examined the effects of social distance (as opposed to closeness) within and across group boundaries on three facets of altruistic behaviors: help-giving (altruistic rewarding), peer punishment (altruistic punishment), and moral courage (altruistic contingency conversion). Using real-life scenarios presented as vignettes, participants were asked to indicate their willingness to engage in the described behaviors in different social settings: a familiar low-distance ingroup, an unfamiliar high-distance ingroup, and a hostile outgroup. We used a pictorial self-other fusion scale (IOS) to measure perceived closeness to the described community. We hypothesized that help giving would be most sensitive and moral courage least sensitive to the manipulated variation of social distance. In both studies, results revealed no significant differences for help-giving, inconsistent results for peer punishment, and a greater willingness to display moral courage in the familiar/close ingroup context compared to the hostile outgroup context. Only when the three altruism facets were considered together across vignettes, ingroup favoritism became evident. Unfortunately, although IOS scores confirmed higher perceived closeness to the ingroup, as expected, it did not discriminate distinctly between the distant ingroup and the hostile outgroup.

On the other hand, facet-specific altruistic trait scores were significantly correlated with vignette responses, supporting the notion of sufficiently valid measures. The studies contribute to our understanding of the social situatedness of altruistic behaviors, and call for the refinement of experimental and self-report measures in the study of altruistic motivation.

**Keywords:** altruism, social distance, self-other fusion, ingroup favoritism, helping, punishment, moral courage

**Presentation type:** Poster Presentation

---

## Learning to Solve the Tower of Hanoi: Explicit and Systematic or Procedural?

Christine Blech \*

*FernUniversitaet in Hagen, Hagen, Germany*

An experiment ( $N = 153$ ) with a computerized version of the Tower of Hanoi (ToH) investigated the effect of repeated practice on problem solving in combination with a self-explanation technique. Within one session, participants solved three blocks of three ToH problems each, the problems being flat-to-flat or tower-to-flat variations of equal average difficulty per block. Depending on their self-reported prior experience, problem solvers were either classified as ToH novices or ToH experts and randomly assigned to one of three verbalization conditions: (a) silent thinking, (b) thinking aloud without specific instruction, (c) self-explanation, i.e., thinking aloud while explaining and justifying each solution step. The expectation that self-explanation promotes efficient problem solving was not supported by a  $3$  (block)  $\times$   $2$  (expertise)  $\times$   $3$  (verbalization condition) mixed ANOVA with the number of ToH moves above the optimal solution as a dependent variable. Both novices and experts improved over time, especially from the first to the second block. Paralleling this effect, the average duration per solution step decreased, suggesting immediate strategy learning. In the third block the solution performance tended to become worse again, especially for the novices, who became faster but less accurate, and especially under the self-explanation condition. The results are discussed with respect to disadvantages through cognitive (over)load and advantages of non-verbalizable visually based pattern strategies and procedural learning. Follow-up research should investigate this by coding the quality and solution systematics in think-aloud protocols.

**Keywords:** Problem solving, Tower of Hanoi, expertise, self-explanation, think aloud, learning

**Presentation type:** Poster Presentation

---

## Controlling a game via steady-state visually evoked potentials

Alexander Blöck <sup>1\*</sup>, Elias Küchle <sup>2</sup>, Sascha Meyen <sup>1</sup>, Volker H. Franz <sup>1</sup>

<sup>1</sup> *Department of Computer Science, University of Tübingen, Tübingen Germany*, <sup>2</sup> *Department of Computer Science, University of Leipzig, Leipzig Germany*

A typical brain-computer interface based on visually evoked potentials (VEPs) presents multiple flickering stimuli to participants. VEPs are recorded via EEG and a machine learning algorithm classifies the VEPs to predict which stimulus the participant is looking at. This can be used to automatically trigger an action, which can be beneficial for certain clinical groups. Stimuli are usually high-contrast white-black patterns, alternating at low-frequency (e.g., 15 Hz). However, looking at such stimuli for prolonged periods of time is tiring. With N=10 participants, we investigated whether gamification combined with stimuli flickering at frequencies beyond the flicker fusion threshold could improve participants' experience. We conducted a gamified experiment (in which participants played the game "2048" by looking at buttons on a computer screen). Stimuli were binary coded by different phase-shifts, such that 'true' reflected black-white flickering and 'false' white-black flickering. Each bit-sequence was shown for 0.5 s on a monitor (refresh rate 120 Hz). Questionnaires indicated that participants were highly engaged. However, decoding VEPs using a stacked regression model only achieved an accuracy of 71.6% (SEM: 7.6%; chance level: 25%), which was substantially reduced compared to our prior (non-gamified) experiments. One possibility to alleviate this accuracy reduction would be to dynamically increase presentation times until the classification model evaluates the accuracy to be sufficiently high. We discuss the potential causes for this accuracy reduction as well as other pros and cons of the gamified experiment as compared to classical, non-gamified experiments.

**Keywords:** EEG, VEP, Low-level Vision, Temporal Processing, Machine Learning, Gamification, Brain-Computer Interface

**Presentation type:** Poster Presentation

## **Validating the Decision Diffusion Model for Olfactory Decisions**

Luisa Bogenschütz <sup>\*</sup>, Markus Germar , Ryan Hackländer , Andreas Mojzisch , Christina Bermeitinger  
*Universität Hildesheim*

The Decision Diffusion Model (DDM) serves as a useful framework for describing two-alternative forced-choice (2AFC) perceptual decisions. It effectively differentiates between judgmental and perceptual biases through its parameters. Although extensively applied in visual and auditory decision-making tasks, the DDM has yet to be validated for olfactory tasks in humans. This study aims to validate the DDM within the context of olfactory decision-making. We utilized an experimental paradigm where participants were tasked with identifying the predominant odor in five distinct two-odor mixtures. Our study design involved manipulating the drift rate by creating two levels of difficulty in the odor mixtures. Each mixture was presented 30 times using an olfactometer. We hypothesize that increased stimulus difficulty will result in a lower drift rate. The results from 20 participants will be presented and discussed.

**Keywords:** Olfaction, 2AFC decision, Decision Diffusion Model, DDM

**Presentation type:** Poster Presentation

---

## **Visualizing Object Detection Algorithms in Highly Automated Vehicles to Improve Remote Assistant's Understanding of the Automated Driving System**

Thorben Brandt <sup>1\*</sup>, Stefan Brandenburg <sup>2</sup>, Marc Wilbrink <sup>1</sup>, Michael Oehl <sup>1</sup>

<sup>1</sup> German Aerospace Center, Institute of Transportation Systems, Braunschweig, <sup>2</sup> University of Technology, Chemnitz

The legal implementation of highly automated vehicles (HAV, SAE L4) in Germany into traffic depends on the availability of a technical supervisor who can be operationalized as a remote assistant. A HAV utilizes artificial intelligence (AI) that help execute the driving task. Though, this AI is highly capable to execute the driving task, but faces still technical limitations that can cause minimal risk maneuvers (MRM) in which the vehicle would stop. A remote assistant can provide support during an MRM and expand the HAV's capabilities. The effectiveness and feasibility of this

depends on the remote assistant's understanding of the system. To improve the assistant's understanding a transparent human-machine interface (HMI) can be used. However, how system transparency can be achieved in an HMI for remote assistance is still unclear. Providing information about the vehicles object detection, for example by boxing detected objects, may improve understanding of the remote assistants. In an experimental online study, we investigated the influence of system transparency using different variants to highlight detected objects on the understanding of remote assistants towards the HAV's AI during an MRM. Participants experienced different MRMs in which they received information about the AI-based object detection via an HMI that augmented the vehicle's video streams (boxing vs. saliency mapping vs. combined). Results provide insights into transparent HMI design for remote assistance, to improve the understanding towards the HAV's AI. This supports the development of remote operation HMIs for an efficient and safe implementation of remote assistance into highly automated driving systems.

**Keywords:** Remote Assistance, Human-AI Interaction, System Transparency, Highly Automated Vehicles (SAE L4)

**Presentation type:** Poster Presentation

---

## Introspection about Forced and Free Choice Processing Times

Daniel Bratzke <sup>1\*</sup>, Ian Grant Mackenzie <sup>2</sup>, Hartmut Leuthold <sup>2</sup>, Victor Mittelstädt <sup>2</sup>

<sup>1</sup> *University of Bremen*, <sup>2</sup> *University of Tübingen*

Free-choice behavior is unique in that actions are internally self-determined, unlike forced-choice behavior, which is externally specified. Several studies suggest these two action modes can lead to different behavioral, affective, and motivational outcomes. We examined whether people estimate free-choice differently from forced-choice processing time due to possible introspective biases associated with these modes. Consistent with previous studies, free choices were slower than forced choices and action mode interacted with perceptual difficulty. Importantly, all effects in mean reaction times (RTs) were mirrored in mean introspective RTs (iRTs). Moreover, objective RTs alone could essentially predict iRTs without any contributing distortion of choice modes. Thus, introspection about RT appears equally accurate for both externally and self-determined actions, suggesting that iRTs are primarily based on a direct read-out of temporal information. Possibly, accurate introspection about processing time is a crucial foundation for potential distinct subjective experiences of free and forced choices.

**Keywords:** introspection, metacognition, free choice, reaction time

**Presentation type:** Poster Presentation

---

## The eye movements of color deficient observers

Doris I. Braun \*, Karl R. Gegenfurtner

*Giessen University Psychology*

Color vision deficiencies are quite frequent in men. However, effects on eye movement behavior have rarely been studied.

We investigated eye movements during visual exploration of high-quality digital reproductions of still-life paintings in normal and color deficient participants. We presented observers with images of the original colored paintings, and with grayscale versions of these images. So far, 37 participants with normal color vision and 24 participants with color deficiencies were tested. We analyzed basic oculomotor measures such as numbers and amplitudes of saccades, positions and durations of fixations and the extents of explored image areas (spread). We also explored scan paths, fixation heatmaps and the chromatic properties of the fixated regions.

We found remarkable little difference in the fixation patterns of dichromatic and color-normal observers, which is probably due to the clear delineation of objects in the paintings. This held for the spatial distribution of fixations, but also for the color distributions of the fixated regions. But we did find that fixation durations of color deficient observers were prolonged on average by 15 ms.

Remarkably, the increase of fixation durations in the color deficient observers was also seen with the grayscale images. It was particularly pronounced for the first fixation.

Color deficient observers may have learned a different fixation strategy to improve information uptake and processing. While previous descriptions of the perception of color deficient observers were often concerned with very specific differences, our results indicate a relatively general effect.

**Keywords:** color vision, color vision deficiency, eye movements

**Presentation type:** Poster Presentation

---

## **Introducing a combinatorial set of 3,125 cartoon characters based on five features for research on categorization, (meta-)memory, judgment, and decision-making**

Arndt Bröder <sup>1\*</sup>, Monika Undorf <sup>2</sup>, Mihail Gututui <sup>3</sup>

<sup>1</sup> *University of Mannheim*, <sup>2</sup> *Technical University of Darmstadt*, <sup>3</sup> *University of Applied Sciences Mannheim*

A set of pictorial stimuli generated by combining five cartoon characters with four five-valued attributes is presented. The attributes are different hats, clothing, gadgets, and shoes. The stimuli can be used in various cognitive research areas like categorization, multiple cue probability learning, judgment, memory, or metamemory. The nonverbal nature is intended to make the stimuli suitable for research with children and adults alike. Study 1 assessed the similarity structure and attribute salience through pairwise similarity ratings, resulting in a salience ordering of cues. This attribute salience, in turn, predictably affected multiple cue probability learning in the judgment task of Study 2. Finally, Study 3 varied similarities (as assessed in Study 1) between distractors and targets in a recognition memory task, yielding the predicted effect of lower performance when similarity is higher. Hence, similarity measures and attribute salience values are psychologically valid. The freely available set (<https://osf.io/dq2k8/>) allows for a rational selection of stimuli when controlling for these aspects is desirable.

**Keywords:** methods, materials, cognition, judgment, categorization

**Presentation type:** Poster Presentation

---

## **The Mediating Role of Psychological Flexibility in the Relationship between Interparental Conflict and Romantic Relationship Attitudes**

Leyla Budak <sup>1, 2\*</sup>, Murat Boysan <sup>1</sup>

<sup>1</sup> *Ankara Social Sciences University*, <sup>2</sup> *Bursa Technical University*

Experiencing conflict between parents in childhood can lead to relationship problems in adulthood, potentially causing individuals to feel anxiety about abandonment and fear of intimacy. Although research has demonstrated a relationship between interparental conflict and romantic relationship dynamics, fewer studies have explored the mechanisms underlying these relationships. This study



aims to investigate the mediating role of psychological flexibility in the relationship between interparental conflict and attitudes toward romantic relationships. According to this Vulnerability Stress Adaptation Model (VSA), enduring vulnerabilities and stress-inducing events influence romantic relationships through adjustment processes. This study, based on the VSA model, examines past interparental conflict experiences as enduring vulnerabilities, psychological flexibility as an adaptive process, and attachment orientations as relational outcomes. A total of 382 people aged 18 to 60 participated in the study by filling out the scales (respectively, Experiences in Close Relationships, Personalized Psychological Flexibility Index, Children's Perception of Interparental Conflict Scale) via Google Forms. According to the preliminary findings of the study, a significant positive relationship was found between insecure attachment and interparental conflict ( $\beta = 0.130$ ,  $p = 0.011$ ). Also, psychological flexibility significantly and fully mediates the relationship between interparental conflict and insecure attachment, however, effect size is small ( $\beta = 0.0477$ , 95% CI [0.0294, 0.3197]). These findings highlight the significance of psychological flexibility and its components, offering a foundation for future research and evidence for clinical interventions targeting romantic relationship problems and past familial conflict experiences. Limitations regarding small effect size and further implications will be discussed in poster.

**Keywords:** interparental conflict, psychological flexibility, attachment orientations, insecure attachment, romantic relationships

**Presentation type:** Poster Presentation

---

## Learning to feel vibrations: Associatively learned boredom but not stress modulates time perception

Müge Cavdan \*, Bora Celebi , Knut Drewing

*Justus Liebig University Giessen*

Emotional states influence our perception of time; for instance; time feels shorter when we are stressed about meeting a deadline but drags when we are bored, such as while waiting in a doctor's office. Associative learning allows pairing emotional states with a neutral stimulus through repeated exposure. Here, in the context of time perception, we investigated whether neutral stimuli such as vibrations acquire emotional value when linked with stress or boredom, potentially influencing the experience of time presented alone. First, we ascertained the efficiency of stress (multitask framework, public speech with counting) and boredom (peg turning and video from (Markey et al., 2014) induction tasks. In the main experiment using within-subjects design, individuals underwent

stress learning, boredom learning, and no learning sessions across three days. During the learning phase, individuals performed either boredom or stress tasks while exposed to a neutral vibration pattern every 5 seconds via a custom multimodal haptic vest (Celebi et al., 2023). After the tasks, participants completed questionnaires on their anxiety and boredom (State-Trait-Anxiety-Inventory and short version of State-Boredom-Scale). Following a 1-hour break, participants performed a temporal bisection task. They first familiarized to discriminate between anchor durations of dots – 400 ms (short) and 700 ms (long). Subsequently, they judged whether the duration of a dot on the screen, lasting 400-700 ms, resembled the previously learned short or long one, while the associated vibration patterns were presented. Boredom-associated vibration patterns made time feel longer, while the stress-associated vibration pattern had no significant effect on time perception.

**Keywords:** time perception, associative-learning, timing, stress, boredom, tactile perception

**Presentation type:** Poster Presentation

---

## Mental health and exposure to psychosocial stress among Afghan refugees in Germany

Luca Clauss-Beggerow \*, Kristian Folta-Schoofs

*Neurodidactics & NeuroLab, Institute of Psychology, University of Hildesheim, Germany*

Afghan refugees are the largest group of refugees in Germany behind Syrians. Since the Taliban takeover in 2021, the number of people seeking refuge continues to rise. Several studies, particularly on Syrian refugees, have already shown that post-traumatic stress disorder (PTSD) and anxiety disorders are particularly common. Generally, health factors are relevant both at the individual level and in perspective at the national level, as they are partly responsible for personal well-being and successful integration. However, the number of published studies on mental health of Afghan refugees is still relatively low, and there is still no comprehensive survey regarding the mental health of arriving refugees in Germany. This study aimed to examine the health of male Afghan refugees who fled to Germany between 2015 and 2023. To this end, the PROTECT (Process of Recognition and Orientation of Torture victims in European Countries to facilitate Care and Treatment) questionnaire, as well as the Generalized Anxiety Disorder Scale-7 (GAD-7), the Patient Health Questionnaire-D (PHQ-D) and Level of Personality Functioning Scale-Brief Form 2.0 (LPFS-BF 2.0) were employed. In addition, we decided to prescreen for PTSD using the PROTECT questionnaire in order to avoid placing additional stress on our sample of refugees and, if necessary, to ensure a better support. Our study aims to gain further insight into the mental health

status of male Afghan refugees. Our data will underline the importance of nationwide prescreening of arriving refugees.

**Keywords:** Afghan refugees, refugee migration, mental health, PTSD, anxiety disorders, integration

**Presentation type:** Poster Presentation

---

## **Does the training of working memory capacity reduce the disruptive effects of auditory deviants on short-term memory?**

Samuel Conrad \*, Florian Kattner

*Health and Medical University Potsdam*

According to the duplex mechanism, short-term memory can be disrupted by two functional distinct forms of auditory distraction. The presentation of acoustic deviants is associated with the diversion of attentional resources away from the focal task towards an irrelevant sound and it was found that the deviation effect is reduced in individuals with higher working memory capacity. On the other hand, the changing-state effect is supposed to be due to involuntary serialisation processing of acoustical changes leading to interference with deliberate serial-order processing. The changing-state effect was found to be independent of individual working memory capacity. The present study investigates the causal effect of working memory capacity on auditory distraction. Therefore, participants' working memory capacity was enhanced through an online cognitive training (n = 28) with eight sessions of an adaptive dual n-back task (requiring responses to visual and auditory targets n trials back). An active control group (n = 28) practiced a non-adaptive dual 0-back task online (eight sessions), requiring responses only to the current trials. Before and after the training, all participants conducted a serial recall task with different types of auditory distractors (e.g., changing-state speech, auditory deviants). Both groups showed comparable improvements in serial recall accuracy, but the working-memory training did not lead to a reliable reduction of auditory distraction. The results suggest that the diversion of attention through irrelevant sound may be less susceptible to cognitive control than previously thought.

**Keywords:** auditory distraction, deviation effect, changing-state effect, cognitive training, working memory capacity

**Presentation type:** Poster Presentation

## **A Meta-Analysis On Affective Modulation of the Congruency Sequence Effect**

Felix Cramer \*, Philipp Schroeder , David Dignath

*University of Tuebingen*

Historically, emotion and cognition have been thought of as antagonists. However, recent research in neuroscience and psychology suggests a functional interaction of emotions and cognitive control. Major theoretical views assume that affects either help or hinder the exertion of control. Empirical studies tested these predictions by presenting emotional stimuli and examining how this affect manipulation changed the congruency sequence effects (CSEs) as a measure of cognitive control. However, mixed findings raised the need for a meta-analytic review of the existing evidence. Therefore, we meta-analyzed data from 34 studies (115 effect-size estimates, N = 2627) that investigated the relationship between emotional stimuli and CSEs in conflict-tasks. Separate meta-analyses compared different affect manipulations (i.e., involving tonic and phasic inductions) and different affect dimensions (i.e., valence and arousal). We found that only tonic valence significantly modulates the CSE with increased control for negative mood. Moderator analysis suggested that the magnitude of affective modulations of CSEs varied as a function of the task used to assess control (e.g., flanker, prime-target, Simon or Stroop task) and that negative and high-arousal stimuli increase CSEs significantly in tasks that implemented flanker stimuli. Taken together, these results support theories that conceptualize control adaptations to be triggered by negative affective responses.

**Keywords:** cognitive control, conflict adaptation, congruency sequence effect, affect, emotion, arousal, valence

**Presentation type:** Poster Presentation

---

## **Cognitive Factors and Instructional Interventions in Map-Based Route Learning**

Hatice Dedetas Satir \*, Stefan Münzer

*University of Mannheim*

Navigational map reading is a daily task, with route learning playing a pivotal role. In this project, we investigated the role of working memory (WM) and perspective-taking ability (PTA) in map-based

route learning, exploring whether instructions about map reading can diminish the influence of WM and PTA. Participants (N = 106) memorized a predefined route on a map and subsequently traced it within a virtual environment. This task was performed twice, with half of the participants receiving specific map reading instructions between the pretest and posttest (instruction condition) whereas the other half not receiving instructions (control condition). The instructions emphasized reading the legend and recognizing landmarks, using landmarks as memorable cues to remember actions, considering the navigation perspective during map reading, verbalizing the route information, and recognizing the initial orientation and direction of the route. Results indicated that WM ( $R^2 = .04$ ,  $p = .045$ ) and PTA ( $R^2 = .128$ ,  $p < .001$ ) were significant predictors of route learning (navigation performance) in the pretest. In the posttest, their impact diminished within the instruction condition but remained consistent in the control condition. While the instructions did not directly enhance performance, they effectively decreased the influence of WM and PTA. In conclusion, cognitive instructions can mitigate the effects of individual differences in crucial spatial abilities in specific tasks, offering insights for educational and training interventions in navigational skills.

**Keywords:** perspective-taking ability, visual-spatial working memory, instructions, map reading, route learning, navigation

**Presentation type:** Poster Presentation

---

## MEG signals predict capacity limitations in working memory

Philipp Deutsch <sup>1, 2\*</sup>, Cora Fischer <sup>1, 2</sup>, Jochen Kaiser <sup>1, 2</sup>, Christoph Bledowski <sup>1, 2</sup>, Benjamin Peters <sup>3</sup>,

4

<sup>1</sup> *Institute of Medical Psychology, Medical Faculty, Goethe University*, <sup>2</sup> *Cooperative Brain Imaging Center, Goethe University*, <sup>3</sup> *Institute for Language, Cognition and Computation, School of Informatics, University of Edinburgh*, <sup>4</sup> *Centre for Cognitive NeuroImaging, School of Psychology and Neuroscience, University of Glasgow*

A hallmark of working memory is its capacity limitation: memory gets poorer when the number of simultaneously memorized items increases. The neuronal origins of this limitation remain unclear. The capacity limitation is typically assessed by asking participants to report a single item out of several concurrently stored ones. Here, we applied a whole-report paradigm where participants reported all items. Specifically, participants memorized one, two or four orientations of Gabor gratings. After a delay, they were asked to rate their confidence about the memory quality (scale from 0=forgotten to 3=best possible remembered) and to reproduce the memorized orientation on a

continuous scale, for every item. This allowed us to assess the number of items rated as forgotten and to estimate the aggregated memory precision for each trial. Participants performed 1600 trials in total while their brain activity was recorded with magnetoencephalography (MEG). Using MEG-beamforming, we applied multivariate pattern analysis to brain activity across the human cortical surface. Preliminary results suggest that activity patterns from posterior cortical regions predicted whether a subject rated items as forgotten. This prediction was pronounced during memory encoding but remained present until report. We found that the activity patterns in posterior regions also predicted the aggregated precision of the reproduced orientations. Interestingly, the precision-related signal resembled the temporal profile of the forgetting-related signal, indicating a common origin of capacity limitations in working memory. Future analyses will examine which factors contribute to the prediction signals including fluctuations of attention between trials or spatial positions and stimulation characteristics.

**Keywords:** visual working memory, capacity limitation, MEG, source reconstruction, MVPA

**Presentation type:** Poster Presentation

---

## Learning attentional control policies through self-organized scheduling.

David Dignath \*

*University Tübingen*

How do we learn to control attention? Is it better to decide what to learn and – if so- why are self-organized learning schedules better? To study control of attention, we assessed how participants acquire different attentional policies in a context-appropriate way. We use a Stroop-like task and manipulated the proportion of congruent-to-incongruent trials separately for two contexts. Then we compared groups of participants that could decide which context to complete next (Choice-group) against groups of participants who were assigned to contexts randomly (Random-group) or based on choices of participants in the choice-group (Yoked-group). We measured how susceptibility to conflict varied with the context-specific proportion congruency (CSPC) manipulation and found larger CSPC effects for the choice and yoked groups compared to random. This suggests that in the CSPC paradigm voluntary control over context scheduling is beneficial, but not because of voluntary control, but rather due to optimal scheduling of context-control associations.

**Keywords:** Cognitive control, attention, Stroop, context-specific proportion congruency, learning

**Presentation type:** Poster Presentation

## Looking Beyond the Face: How Inner and Outer Features Shape Face Matching Strategies

Belkıs Durmuş \*, Sonia Amado

*Ege University, Department of Psychology*

Research on face matching has traditionally focused on inner facial features under controlled conditions, such as the eyes, nose, and mouth. While this has deepened our understanding of feature-based processing, it lacks ecological validity, as real-world face matching often includes outer features like hair and face color. These features may provide critical context for identifying individuals in more naturalistic settings, yet their role remains unclear. Moreover, previous studies have rarely examined how reliance on different features may vary across individuals with differing face recognition abilities. This study addresses these gaps by incorporating both inner and outer facial features into a face-matching task, creating a more ecologically valid paradigm. Using eye-tracking, we explored how attention to inner and outer features affects matching accuracy and investigated individual differences across participants, including those at the extremes of face recognition ability. 98 participants (including 8 super-recognizers and 3 prosopagnosics) completed the Kent Face Matching Test (KFMT) and the Cambridge Face Memory Test (CFMT+). In trials where participants provided correct answers, there were fewer but longer fixations towards the inner-face features. In contrast, incorrect responses were associated with more and prolonged fixations on the mouth and hair regions. Individual analyses showed that 2 super-recognizers focused more on eyes and nose, while all prosopagnosia participants focused on the mouth and hair. Sustained attention to the mouth and hair worsened performance, underscoring the role of single-case analysis in understanding individual differences in face matching.

**Keywords:** Eye movements, Face matching, Super-recognizers, Individual differences, Single-subject analysis

**Presentation type:** Poster Presentation

## How Do Incidental Emotions Shape Our Moral Judgments?

Şevval Düzgün <sup>1\*</sup>, Hasan Galip Bahçekapılı <sup>2</sup>

<sup>1</sup> Ege Üniversitesi, <sup>2</sup> İstanbul Medipol Üniversitesi

In the moral psychology literature there are two basic views on how people make moral judgments: by calculating benefit and cost and paying attention to maximum benefit (Utilitarianism) or by reference to norms (Deontology). Gawronski et al. (2017) criticized the measurements that evaluate these two views on a single dimension in opposition to each other and put forward the CNI model. The CNI model is a computational model that measures sensitivity to the outcome (C), sensitivity to moral norms (N), and overall preference for action versus inaction (I) in response to moral dilemmas. In the present study, the effects of incidental emotions on moral judgments are examined through the CNI model. Participants (N=261) were randomly assigned to four different emotion groups (mirth, disgust, moral elevation, and neutral) and emotion manipulation was performed by watching the videos. Incidental emotions' effects on C, N, I paradigms were analyzed via multinomial processing tree(MPT) modeling. As a result of the analysis, it was seen that incidental mirth increased the N parameter scores. Although incidental disgust did not have a significant effect on the C, N, I parameters, when the disgust manipulation group was divided into high and low disgust sensitivity groups, the I and N parameters of the group with high disgust sensitivity were found to be significantly higher. On the other hand, there was no significant effect of incidental elevation on C, N, I parameters. The results of the current study are discussed with reference to previous findings in the moral judgment literature.

**Keywords:** moral judgments, CNI model, incidental emotions, mirth, disgust, elevation.

**Presentation type:** Poster Presentation



## **Larger Pupils Enhance Visual Detection Performance Under Varying Degrees of Physical Effort**

Lisa Eberhardt <sup>1\*</sup>, Christoph Strauch <sup>2</sup>, Anke Huckauf <sup>1</sup>

<sup>1</sup> *General Psychology, Ulm University, Germany*, <sup>2</sup> *Experimental Psychology, Helmholtz Institute, Utrecht University, Utrecht, the Netherlands*

Pupil size mainly responds to changes in illumination, likely to optimize vision for the given level of brightness, but it also fluctuates with changes in the alerting system. Recently, it has been argued that such pupil dilations also subserve a perceptual function: Due to the eye's optics, detection performance in the periphery should be enhanced when pupils are larger, like during states of high effort. We investigated peripheral visual detection during somatosensory stimulation, that is physical effort. In three experiments, two with physical tasks, one with tactile stimulation, data confirmed that the larger the absolute pupil size, the better the peripheral visual detection performance. However, the stronger the relative pupil dilation caused by somatosensory stimulation, the lower the detection performance. The findings show that optical effects can be estimated by absolute pupil size, and effects of effort can be estimated by relative changes in pupil size. In sum, larger pupils benefit peripheral detection and higher states of effort go hand in hand with decreased detection performance. This suggests an intriguing relationship: pupil dilation under high states of effort may partially compensate for the herewith associated decrease in peripheral detection, thereby helping us to navigate in and interact with the environment.

**Keywords:** pupil size, peripheral vision, visual detection, physical effort, somatosensory activity

**Presentation type:** Poster Presentation

## **Does Working Memory Moderate the Relationship of Stereotypes and Girls' Mental Rotation?**

Miro Ebert \*, Leonardo Jost , Petra Jansen

*Universität Regensburg*

Research highlights the significance of spatial ability in science, technology, engineering, and mathematics (STEM). Gender differences in favor of males are observable in STEM enrollment and often also in spatial cognition. Previous studies suggest that factors such as stereotyping and working memory functioning may play an important role in this context. In a prior study, we found that children as young as preschool age already hold implicit and explicit gender stereotypes about spatial ability. Moreover, implicit gender stereotypes were linked to mental rotation accuracy in girls: stronger stereotypes favoring boys/men were associated with poorer mental rotation performance. To gain further insights into this relationship and the potential moderating role of working memory, we are conducting a follow-up study. In this study, we assess implicit stereotypes, mental rotation performance, and visuo-spatial working memory capacity in preschool girls. The relationship between implicit gender stereotypes and mental rotation performance will be tested confirmatorily. Additionally, we will evaluate whether working memory capacity moderates this relationship. Data analyses will be performed using generalized linear mixed models with the lme4 package in R. Based on an a-priori power analysis conducted with G\*Power, our target sample size is N=53. Data collection is expected to be completed by February, and we anticipate having results ready to present at the conference. The study was preregistered on osf.io.

**Keywords:** mental rotation, spatial ability, gender stereotypes, human sex differences, preschool, children

**Presentation type:** Poster Presentation

## **How to be seen in the forest - visual search for people wearing different levels of protective clothing**

Florian S. Oswald , Wolfgang Einhäuser \*

*Chemnitz University of Technology*

To prevent logging and hunting accidents, people in forests should be well-visible to others. However, there is debate which kind of protective clothing should be required. We created a database with 20 different individuals photographed in forestal settings. They wore four different clothing variants adding to typical forest garment: Two conditions included protective clothing, either a reflective vest or a hat with reflective hatband. We included two conditions without protective clothing, either with a hat (without hatband) or with no hat, and a condition without person. We cropped and scaled these images to generate 800 stimuli (160 per condition). These were presented to N=16 observers, who were asked to respond as quickly as possible without sacrificing accuracy whether a human was present. Reaction times (RTs) and miss rates depended on clothing. The two conditions without protective clothing had indistinguishable error rates, while fewer errors occurred with hatband, and even fewer with the vest. RTs were faster with protective clothing than without. In the absence of protective clothing, responses were faster without hat. Interestingly, vest and hatband led to indistinguishable RTs. However, individuals in vests were looked at earlier than individuals without. This difference between RTs and fixation latencies is likely explained by a frequent additional saccade from vest to face before the response, presumably to verify the human presence. In conclusion, although RTs suggest no advantage for wearing reflective vests over hatbands, error rates and eye-tracking data reveal a potentially critical safety benefit of wearing reflective vests in forestal environments.

**Keywords:** attention, vision, work safety, eye movements, visual search

**Presentation type:** Poster Presentation

## Are YOU going to change the world? Predicting scientific creativity in young scientists

Vera Eymann <sup>1\*</sup>, Daniela Czernochowski <sup>1</sup>, Thomas Lachmann <sup>1, 2, 3</sup>

<sup>1</sup> *Rheinland-Pfälzische Technische Universität Kaiserslautern - Landau (RPTU)*, <sup>2</sup> *Centro de Investigación Nebrija en Cognición (CINC), Universidad Nebrija, Madrid, Spain*, <sup>3</sup> *Brain and Cognition Research Unit, Faculty of Psychology and Educational Sciences, KU Leuven, Leuven, Belgium*

“Scientific creativity is the ability of conducting creative science experiments and finding out and solving creative science problems and science activities” (Raj & Saxena, 2016; p. 1122). It is seen as a key factor in meeting the many challenges of our time, such as climate change, medical care, belief in conspiracies, or even global pandemics. This need for innovation is offset by another phenomenon: Since the late 1940s, groundbreaking discoveries in science have been on the decline. This means that scientific articles and even patents are much less likely to be genuine innovations, but are often merely an adaptation or improvement of existing achievements. In this study, we investigate several personality factors that predict scientific creativity in university students using our novel scientific creativity task. In this task, participants from the interdisciplinary field of cognitive science are asked to prepare research proposals for investigating an innovative question from their specific fields of study. The quality of the research proposals is classified by experts from the respective disciplines as well as participants themselves using a structured rating procedure. We further measure fluid intelligence, general creative potential, as well as demographic data. Our study thus serves to establish a measurement for scientific creativity suitable for the academic context, as well as an indicator for the extent to which the measured factors are suitable predictors for scientific creativity in university students.

Raj, H., & Saxena, D. R. (2016). Scientific creativity: A review of researches. *European Academic Research*, 4(2), 1122-1138.

**Keywords:** Scientific Creativity, Intelligence, Creativity, Problem-solving

**Presentation type:** Poster Presentation

## **Simon, Stand Up: The influence of sitting and standing on the vertical Simon effect**

Pia Fenske \*, Pamela Baess , Christina Bermeitinger

*Universität Hildesheim*

The Simon paradigm investigates the influence of task-irrelevant spatial features when participants react to the task-relevant feature, such as color. Participants generally show faster and more accurate responses when the stimulus and response locations overlap (compatible trials) than if the locations are on opposite sides and do not overlap (incompatible trials). The Simon paradigm is most often used with a horizontal stimulus display, but in the case of a vertical Simon task, the stimuli are displayed above or below the fixation cross while the response buttons can be labelled the same.

Researchers discuss if body position can impact cognitive conflict tasks such as the Simon paradigm. Our previous research found no modulation of the horizontal Simon effect due to body position. This poster will focus on how the vertical Simon effect is influenced by body position. In two experiments, participant had to perform in a vertical Simon task during sitting and standing. The focus will be if a modulation due to the body position can be found.

**Keywords:** vertical Simon effect, cognitive control, body position, sitting vs. standing

**Presentation type:** Poster Presentation

---

## **The impact of movement: a hybrid foraging study**

Alicia Ferrer-Mendieta <sup>1, 2\*</sup>, Marcos Bella-Fernandez <sup>2</sup>, Beatriz Gil-Gómez de Liaño <sup>2</sup>

<sup>1</sup> *Departamento de psicología básica, Universidad Autónoma de Madrid.*, <sup>2</sup> *Departamento de psicología social y metodología, Universidad Autónoma de Madrid*

Hybrid foraging is a type of visual search in which observers search for multiple instances of several types of targets. Looking for different target types allows us to study the diverse strategies used in search, such as responding in runs (consecutive target selections) or switches (alternations between targets), and adapting the length of runs depending on tasks demands. Importantly, we can study how those strategies affect performance by examining searching time or whether observers leave a patch when it is optimal (or not). In human research both dynamic and static

tasks have been used to study observers' performance in hybrid foraging, however they have not been compared within the same study to determine how movement may affect performance and strategies in such tasks. In the present study, 29 young adults performed three hybrid foraging situations under different dynamicity conditions: static (no movement), dynamic I (slow-44 pixels/sec) and dynamic II (fast-88 pixels/sec), using the FORAGEKID task (Gil-Gómez de Liaño & Wolfe, 2022). We found significantly more runs for the slowest dynamic condition, but no differences showed up in the length of those runs. Movement also significantly affected quitting rules showing observers leave earlier in static situations in a suboptimal way according to MVT, but in all the conditions staying longer than the optimal (MVT ratio <1). Altogether, the results show that movement has an impact in foraging performance worth further investigation given the dynamic nature of many human natural foraging tasks like searching for friends in a crowd.

**Keywords:** Hybrid Foraging, FORAGEKID task, Visual search, Dynamicity, Movement.

**Presentation type:** Poster Presentation

---

## Targeted Memory Reactivation (TMR) through Odor Presentation in a School Context: Enhancing Math Performance and Memory Recall in Elementary Students

Dominik Fetterroll <sup>1\*</sup>, Yee Lee Shing <sup>1, 2</sup>, Iryna Schommartz <sup>1, 2</sup>

<sup>1</sup> *Department of Psychology, Goethe University Frankfurt*, <sup>2</sup> *IDeA – Center for Individual Development and Adaptive Education*

Targeted Memory Reactivation (TMR) is a well-established mechanism that facilitates memory consolidation and reduces fear conditioning by reactivating memory content associated with a specific contextual stimulus during Slow-Wave Sleep (SWS). However, whether TMR can improve cognitive performance in a school-related context remains underexplored.

In this study, we applied TMR in a longitudinal experimental crossover design over one school semester with fourth-grade elementary school children at risk. A specific odor was presented during math classes and bedtime at the children's homes. Groups were matched based on their math performance in third grade. Daily math classes were conducted, and weekly math performance tests were administered. Additionally, we conducted four word-pair recall tests and two recognition tests. Baseline measurements, conducted in the first two weeks after summer vacation using content from third grade, confirmed comparable performance between the groups.

Preliminary results indicate that the treatment group achieved higher weekly math test performance compared to the control group, while geometry performance remained similar across both groups. Furthermore, the treatment group demonstrated superior memory recall performance in word-pair tests compared to the control group, although recognition performance did not differ significantly. We also explore whether math anxiety was reduced in the TMR group compared to the control group.

Our findings provide the first longitudinal evidence for the application of TMR in a school context, linking it to improved math performance and general memory abilities. We discuss the potential implications for extending this research and its relevance for educational strategies.

**Keywords:** Elementary, tmr, Target Memory reactivation, recognition, recall, Word pair, odor

**Presentation type:** Poster Presentation

---

## Exploring attachment styles and their association with attentional network efficiency

Lara Fetzer \*

*University of Ulm, Department of General Psychology*

According to Posner and Rothbart (2007), parental care is thought to play an important role in the development of the attentional network. The present study aimed to empirically test this proposition by examining whether experienced parental care, reflected in attachment styles, is associated with attentional network efficiency. Two exploratory online studies, conducted via *PsyToolkit.org* with identical design, examined this relationship using the Attention Network Test (ANT). The stimuli were attachment-neutral. The first study included 91 undergraduate participants ( $M = 20.63$  years,  $SD = 2.72$ ; 84% female, 16% male) recruited through an undergraduate course. The second study included 65 adult participants ( $M = 26.85$  years,  $SD = 7.60$ ; 78% female, 20% male, 2% diverse) recruited through SurveyCircle. Attachment dimensions (secure, avoidant, anxious) were assessed using the German State Adult Attachment Measure (SAAM). While neither study yielded statistically significant results, the combined data set revealed weak correlations: avoidant attachment was positively correlated with the executive effect ( $r = .17$ ,  $p < .05$ ) and negatively correlated with the alerting effect ( $r = -.16$ ,  $p < .05$ ). These findings may support the hypothesis of an effect of attachment on the efficiency of the attentional networks, but should be interpreted with caution, as the confidence intervals of the correlations include zero and the range restriction (~80% securely

attached participants) limits the variability in attachment dimensions. Future studies should investigate whether the relationship between avoidant attachment and reduced attentional network performance persists, using experimental designs such as attachment priming.

**Keywords:** Attentional Networks, Attention Network Test (ANT), SAAM, Attachment dimensions, Avoidance

**Presentation type:** Poster Presentation

---

## Representations of Scene Beauty in Space and Time: An EEG-fMRI Fusion Study

Philipp Flieger <sup>1\*</sup>, Rico Stecher <sup>1</sup>, Daniel Kaiser <sup>1, 2</sup>

<sup>1</sup> *Department of Mathematics and Computer Science, Physics, Geography, Justus Liebig University Gießen, Germany,* <sup>2</sup> *Center for Mind, Brain, and Behavior, Justus Liebig University Gießen, Philipps University Marburg and Technical University Darmstadt, Germany*

How does neural activity give rise to the perception of beauty in our environment? Previous EEG work suggests neural representations of beauty emerge during early perceptual processing and are temporally sustained. Complementary fMRI work pinpoints the neural correlates of beauty to visual, frontal, and default-mode network (DMN) areas. An integrated view of the spatiotemporal dynamics that give rise to the perception of beauty, however, is lacking. In separate EEG (N = 52) and fMRI (N = 29) studies, participants rated the beauty of 100 scene photographs. We then performed a model-based EEG-fMRI fusion to investigate the spatiotemporal dynamics of beauty-related representations. Specifically, we obtained the representational similarities between EEG responses at every time point and representational similarities between fMRI responses for 100 brain parcels. We then determined how much of the correspondence between EEG and fMRI-derived similarities is explained by beauty ratings. Our results suggest that representations underlying beauty judgments emerge early (peaking at 275ms post-onset), are long-lasting, and span visual, frontal, and DMN areas. This spatiotemporal signature remained robust when controlling for image-quality ratings (obtained separately, N = 43). When additionally controlling for visual features extracted by a VGG16 deepnet model, we found strongly reduced beauty-related activations, particularly in visual cortex. Conversely, beauty-related activations in frontal and DMN regions remained relatively unaffected. These representations still emerged remarkably fast (within 225ms). We conclude that



the perception of beauty involves rapid and spatiotemporally sustained processing related to visual correlates of beauty, while the DMN concurrently forms more abstract representations of beauty.

**Keywords:** neuroaesthetics, fusion analysis, representational similarity analysis, scene perception

**Presentation type:** Poster Presentation

---

## **Guess What? Only Correct Choices Forge Immediate Stimulus-Response Bindings in Guessing Scenarios**

Anna Foerster <sup>1\*</sup>, Viola Mocke <sup>2</sup>, Birte Moeller <sup>1</sup>, Roland Pfister <sup>1</sup>

<sup>1</sup> Trier University, <sup>2</sup> University of Würzburg

A central mechanism of action control is binding between actions and the stimuli provoking them. Perceiving the same stimuli again retrieves any bound responses, facilitating their execution. Does such binding and retrieval only emerge when stimulus-response rules are known before taking action or also when agents are forced to guess and receive feedback about the success after responding? We tested the hypothesis that knowing rules before responding would boost stimulus-response binding relative to guessing situations. We also assessed whether the content of the feedback matters for binding in that agents might use feedback to build correct stimulus-response bindings even for wrong guesses. We used a sequential prime-probe design to induce stimulus-response binding for prime responses that were either rule-based or guesses and to measure retrieval of these bindings in response times and errors in the probe. Results indicate that binding and retrieval emerges for successful but not for wrong guesses. Binding effects for correct guesses were consistently small in effect size, suggesting that pre-established stimulus-response bindings from instructed rules might indeed boost binding when taking action.

**Keywords:** action control; binding and retrieval; rules; error processing; instructions

**Presentation type:** Poster Presentation

## Eye-hand coordination in multiple object interception

Jolande Fooker \*

*TU Darmstadt, Germany, Queen's University, Kingston, Canada*

When interacting with a moving object, observers typically keep their eyes on the object to continuously update its position and integrate motion information. Yet, in real-world settings, such as in traffic, observers may be required to simultaneously interact with multiple moving objects. Here, eye-hand coordination was tested in human observers that used a Kinarm robot to intercept or avoid multiple falling objects. In the 'hit' condition, observers attempted to intercept all objects, while the number of objects that simultaneously moved down the screen gradually increased from 1 to 8. In the 'hit and avoid' condition, observers attempted to hit filled targets and avoid open targets. The ratio of 'hit' to 'avoid targets' was always 2-1 and the number of falling objects increased from 3 to 6 to 9. In the 'hit condition', interceptive performance decreased when more than 4 objects had to be intercepted simultaneously. Observers attempted to track each object with foveal (i.e., high acuity) vision and were better at intercepting foveated objects compared to objects that were tracked peripherally. In the 'hit and avoid' condition, observers consistently intercepted 'hit targets', while eluding 'avoid targets'. Moreover, observers used peripheral vision to recognize 'avoid targets' whenever possible, making foveal vision available for tracking the 'hit targets'. These results indicate that observers attempted to track each moving object with foveal vision to aid accurate object interception. Critically, patterns of eye hand coordination—i.e., whether and how long each object was tracked—flexibly adapted with changing visuomotor task demands.

**Keywords:** Eye movements, eye-hand coordination, interception, motion prediction, sensorimotor control

**Presentation type:** Poster Presentation

## **Torn Between Self and Others: Investigating the Relationship Between Decision Conflict and Ambivalence in Prosocial Behavior With Mouse-Tracking**

Celine Frank <sup>1, 2\*</sup>, Angela Dorrough <sup>1, 3</sup>, Iris Schneider <sup>2</sup>

<sup>1</sup> *University of Cologne*, <sup>2</sup> *TU Dresden*, <sup>3</sup> *University of Hagen*

People often face decision conflict when choosing between prosocial and self-serving behaviors, torn between their prosocial motive to help others and their selfish motive to avoid personal costs. Such decisions put people in a tough spot, as neither choice can satisfy both motives. We hypothesize that in such prosocial decision-making, the degree to which people feel conflicted between behaviors is positively associated with ambivalence about the selected behavior, as consequently, fulfilling one motive may lead to positive feelings, while neglecting the other may result in negative feelings at the same time. To test this, we conducted an incentivized mouse-tracking study where participants played ten rounds of a binary dictator game, choosing between two transfer amounts. One amount always allowed participants to keep more money for themselves, while the other gave more to the recipient. After each choice, participants rated their positive and negative feelings and reported their levels of decision conflict and ambivalence. The results of this preregistered study (N = 150) will be presented.

**Keywords:** decision conflict; ambivalence; prosocial behavior; mouse-tracking

**Presentation type:** Poster Presentation

---

## **Investigating constant task performance under varying mental load through changes in task difficulty and distraction due to a noisy soundscape: An ERP perspective**

Marion Freyer <sup>1\*</sup>, Kim-Aljoscha Bressen <sup>1</sup>, Jan Grenzebach <sup>2</sup>, Thea Radüntz <sup>2</sup>

<sup>1</sup> *Federal Institute for Occupational Safety and Health, Unit 3.1 Prevention of Work-related Diseases*, <sup>2</sup> *Federal Institute for Occupational Safety and Health, Unit 2.4 Artificial Intelligence in Work Systems*

Mobile work has become an increasingly important job environment in recent years, particularly for job profiles that require predominantly cognitive processes. Flexible work locations might offer advantages for flexibility, but also introduce new challenges like uncontrollable background noise,

which can interfere with well-being, increase stress, and affect mental load. This study investigates the impact of realistic background noise on cognitive performance and mental load using electroencephalography (EEG) in a laboratory study.

Twenty participants completed both an easy and a moderate condition of the n-back task while being exposed to silent and noisy stimuli that should be fully ignored. The noisy stimuli contained a high-speed passenger train soundscape including irrelevant speech, machine noise, and other realistic ambient sounds. Both stimuli were presented through headphones at approximately 60 dB(A). Performance data and event related potentials (ERP) from the EEG have been recorded and analyzed with regard to differences between the experimental conditions. Participants were divided into two groups of noise sensitivity to examine differences between them.

Analysis of reaction time and ERP components indicates the influence of noise on performance and the mental load imposed by the cognitive task. In addition, noise sensitive participants show a stronger neural response to the presented visual stimuli.

These findings may provide insights into the hidden sources of cognitive workload in at a first glance harmless mobile work environment. Moreover, they offer an understanding of the neuronal activation as related to noise perceptual filtering processes, which are crucial for examining the non-auditory effects of noise.

**Keywords:** electroencephalogram, mental load, ERP, noise sensitivity, cognition

**Presentation type:** Poster Presentation

## Issues in Grounded Cognition and How to Solve Them – The Minimalist Account

Jannis Friedrich <sup>1\*</sup>, Fischer Martin H. <sup>2</sup>, Markus Raab <sup>1</sup>

<sup>1</sup> German Sport University Cologne, <sup>2</sup> University of Potsdam

Embodied approaches to the mental representation of concepts, called grounded cognition, often argue that brain regions which support action and perception are also those which are active during interaction with concepts, such that understanding the word kick draws on the same neural resources as the action itself. Yet, such research has made little progress in arriving at a theoretical description of mental representations as a result of an impasse in theory. The two prominent theories, perceptual symbol systems (Barsalou, 1999) and conceptual metaphor theory (Lakoff & Johnson, 1987), have gone largely unchanged since their inception. We argue that they were prematurely advanced, making too many assumptions, which generated a series of self-reinforcing issues. Theoretical work struggled because the high specificity of the original theories generated a fragmented field (Bringmann et al., 2022). This led, in turn, to agnostic empirical work which typically avoided focus on any one specific theory, preferring to demonstrate 'embodied effects' more generally (Anderson, 2008). Yet, this lack of theoretical allegiance prevents cumulative progress; findings which cannot be organized by the structure of a theory fail to build on one another. Our proposal is a critical methodological advancement to future work on embodiment because it removes this impasse, allowing even formerly-agnostic empirical work to cumulatively progress because it can explicitly position itself in the overarching theoretical framework we call the minimalist account. From past work, we have extracted those mechanisms which have exceedingly strong support, creating a useful, simple, and evidence-based framework that advances grounded cognition research.

**Keywords:** embodied cognition, mental representation, theory specification, simulation, metaphor, grounded cognition, semantics

**Presentation type:** Poster Presentation

## **The influence of free choice on memory: Generalization from recognition to cued recall in a vocabulary-like learning task**

Kerstin Fröber <sup>1, 2\*</sup>, Markus Janczyk <sup>3</sup>

<sup>1</sup> *University of Cologne*, <sup>2</sup> *University of Regensburg*, <sup>3</sup> *University of Bremen*

Recognition memory can be improved by free choice, even with arbitrary free choices without impact on the learning content itself. This is promising from an applied perspective, but given different forms of tests in educational contexts, generalization of this effect to recall memory is important. Therefore, we used a vocabulary-like learning task with either a free or forced choice preceding a Japanese-German word pair. More precisely, prior to the presentation of each word pair, participants were either instructed (forced choice) or allowed to choose (free choice) whether the next German word would be from the first or second half of the alphabet. The subsequent test phase comprised a recognition test for the Japanese words including additional lures, followed by a cued recall test for the German translation. Recognition memory was measured on a 6-point confidence scale, and receiver operating characteristic curves were estimated based on the unequal variances signal detection model of recognition memory. Consistent with previous results, free choice before learning improved recognition memory ( $d_{\text{free}} = 1.23$ ,  $d_{\text{forced}} = 1.08$ ). More importantly, participants also showed a free-choice benefit on cued recall performance with a 5% increase in correct recall, suggesting generalizability from recognition to recall memory. Data are currently being collected for a conceptual replication using Japanese symbols as memory items. Applied to an educational setting, establishing a self-directed learning situation with arbitrary control by students, which does not influence the predetermined learning content, seems like an easily applicable tool for teachers to improve memory performance of their students.

**Keywords:** memory, recognition, cued recall, choice, self-directed learning

**Presentation type:** Poster Presentation

## Can Anticipatory Saccades in Learning Quizzes Predict Exam Success?

Eva Förner \*, Noah Mauß , Katrin Prantl , Christina U. Pfeuffer

*Catholic University of Eichstätt-Ingolstadt*

Students' ability to self-evaluate is crucial for learning and academic success. However, global explicit self-evaluations (self-reports; e.g., self-assigned grades) are prone to biases. Here, we examined whether eye movements in learning quizzes can be used as a trial-based, implicit measure of self-evaluation and predict exam success. Participants' answers to learning quiz questions triggered a lateralized positive/negative feedback after a short delay (anticipatory interval between answer and feedback). Crucially, per participant, correct feedback was always displayed on one side of the screen and error feedback on the opposite side. During the anticipatory interval between answer and feedback, question and answer options either remained on screen or disappeared (display condition). This manipulation allowed us to investigate whether the absence of visual stimulation was essential to infer implicit self-evaluations from anticipatory saccades, eye movements to the correct/error feedback side prior to feedback appearance. We used a signal detection approach to assess the (mis)match between participants' anticipatory saccades and the correctness of their respective quiz answers. Corresponding signal detection measures were then used to predict learning quiz performance and later exam success using linear mixed models. Sufficient numbers of anticipatory saccades occurred for both display conditions. Yet, signal detection measures derived from anticipatory saccades failed to predict exam success in both display conditions, whereas global explicit self-evaluations (self-assigned grades) significantly predicted exam success. We discuss why trial-based and implicit measures of self-evaluations seem to fail at predicting future exam success.

**Keywords:** learning, self-evaluation, anticipatory saccades, eye movements, exam success

**Presentation type:** Poster Presentation

## **Comparing automatic processing of age, gender and facial expression in face stimuli**

Robert Gaschler <sup>1\*</sup>, E. Helin Yaban Yalcin <sup>1</sup>, Christoph Naefgen <sup>1</sup>, Helen Landmann <sup>2</sup>

<sup>1</sup> FernUniversität in Hagen, <sup>2</sup> Universität Klagenfurt

Using the FACES stimuli (<https://faces.mpdl.mpg.de/imeji/>) we compared the extent of automatic processing of age, gender and facial expression. In different blocks of 200 face stimuli participants were asked to either categorize face photos by age (rather young vs. rather old), gender (rather female vs. rather male) or emotional expression (rather emotionally expressive vs. rather neutral). The participants were presented with blocks of the three different tasks in random order. For each task there were two blocks of 200 stimuli: one with happy vs. neutral faces and one with sad vs. neutral faces (counterbalanced across participants). Overall each participant worked on 6 blocks (1200 trials total). After excluding 2 participants with an error rate >10%, we analyzed the data of N=90 participants of this within-subjects laboratory experiment. In order to tap into the extent of automatic processing, we focused on RT effects of repetition vs. change of task-irrelevant features from trial n-1 to the current trial. As a main effects we obtained RT costs if gender changed or if age changed as task-irrelevant feature between the preceding and the current trial. Repetition vs. change of emotional expression as task-irrelevant feature did moderate RT in interaction with the repetition vs. change of the task relevant feature.

**Keywords:** emotion expression, binding, response-distractor binding, automatic processing

**Presentation type:** Poster Presentation

---

## **An in-depth look into lateralization in slime molds**

Rowena Gehrke <sup>\*</sup>, Jannes Freiberg

*Christian-Albrechts-Universität zu Kiel*

In literature, an experiment conducted by Dimonte, Adamatzky, Erokhin and Levin (2016) shows evidence of lateralized movement of the unicellular slime-mold *Physarum polycephalum* in T-labyrinths. While behavioral lateralization is a common phenomenon observed in higher animals, it is far from ubiquitous, and not yet reported in non-animals. Notwithstanding the authors' assertion that this phenomenon would be a natural consequence of the cytoskeleton of single-celled organisms, no other observations on this subject have been reported in the literature. Moreover, it



would be astonishing to discover behavioral lateralization in a formless organism, predating even animals. To further investigate this, an in-depth replication experiment was conducted. In consideration of the amoeboid organism's diverse sensory capabilities, we controlled for the influence of light, vibration, artificial magnetic fields and the magnetic field of the earth. To induce genetic diversity, slime molds originating from France and Germany were used. The experiments conducted on over 1,000 individual organisms demonstrate the absence of generalized behavioral lateralization in both genotypes. However, due to our results we suggest an effect of illumination, vibration and magnetic fields on movement. Therefore, we come to the conclusion that slime molds show no inherent lateralized movement, and that lateralization is an artifact of the experimental conditions.

**Presentation type:** Poster Presentation

---

## **Tracking flow in real time: A novel approach for continuous subjective measurement**

Sura Genc <sup>1\*</sup>, Elif Surer <sup>2</sup>, Marc Wittmann <sup>3</sup>, Tzvetan Popov <sup>1</sup>, Bigna Lenggenhager <sup>1, 4, 5</sup>

<sup>1</sup> *University of Konstanz*, <sup>2</sup> *Middle East Technical University*, <sup>3</sup> *Institute for Frontier Areas of Psychology and Mental Health*, <sup>4</sup> *University of Zurich*, <sup>5</sup> *AIR- Association for Independent Research*

Flow is defined as an optimal state characterized by individuals becoming deeply absorbed in a task. Flow research typically involves collecting physiological data during a task and associating them with subsequently completed self-reports. However, this approach is limited, as self-reports provide cumulative assessment of the experience, lacking the temporal resolution required to be analysed with physiological data and failing to capture flow as it unfolds in real time. Here, we introduced a novel method that enabled the continuous and real-time collection of subjective and physiological measurements of flow. Participants continuously indicated their perceived degree of flow by pressing a custom-made foot pedal during the task (i.e., pedal-recorded flow). They (N = 40) played the video game Thumper in two conditions: one with the pedal and one without, while their heart rate was recorded using electrocardiography. After each condition, participants completed a self-report (i.e., Flow Short Scale, FSS in short). Thereby, we investigated whether pedal interfered with (a) participants' flow experience and (b) physiological responses (i.e. heart rate variability), and whether (c) pedal-recorded flow reliably correlated with flow scores obtained through the FSS. Results indicated that the pedal did not interfere with (a) participants' flow experience or (b) heart rate variability. Moreover, (c) pedal-recorded flow during the second half of the task showed

correlation with the flow measured by FSS, suggesting that pedal provided a reliable measure of flow experience.

**Keywords:** flow experience, real-time measurement, continuous data, heart rate variability

**Presentation type:** Poster Presentation

---

## **Does motor skill training improve cognitive function in elderly? An ongoing study.**

Sina Janine Gerten <sup>1, 2\*</sup>, Dirk Koester <sup>3</sup>, Thomas Schack <sup>1, 2</sup>

<sup>1</sup> *Neurocognition and Action – Biomechanics Research Group, Department of Sports Sciences, Faculty of Psychology and Sport Science, Bielefeld University, Bielefeld, Germany*, <sup>2</sup> *Center of Excellence “Cognitive Interaction Technology”, Bielefeld University, Bielefeld, Germany*, <sup>3</sup> *Sport Psychology, Faculty Business and Management, BSP Business School Berlin, Berlin, Germany*

Besides endurance training also resistance, coordination and multicomponent exercise training has a positive effect on cognitive functions (CF). However, it remains unclear if there are more types of physical training which have an impact on CF and brain activity, such as a motor skill training, where the focus lies on improving the technique. Therefore, the purpose of this RCT was to evaluate the effect of a 16-week track and field athletic training (motor skill training) on behavioral CF and brain activity of elderly, when compared to walking training (cardiovascular training) and to toning and relaxation training (active control group). A motoric test battery, questionnaires, and a cognitive test battery including EEG recordings was performed pre and post training intervention. The following outcomes are relevant for this analysis: Global cognitive function (Montreal Cognitive Assessment, MoCA), attention (d2-revision Test, Trail Making Test A, TMT), executive control function (and TMT B, Flanker task, Stroop task) and working memory (n-back task). Data was analyzed via mixed ANOVA. Sixty-Six older adults (age  $64 \pm 5$ ; female 33; MoCA  $27 \pm 2$ ) were included in the analysis. There was no statistically significant interaction between time and group. A significant main effect for time was found for d2:  $F(1, 42) = 26.07$ ,  $p \leq .001$ , partial  $\eta^2 = .383$  and TMT-A:  $F(1, 43) = 4.56$ ,  $p = .038$ , partial  $\eta^2 = .096$ . EEG data is currently being analyzed. The present findings indicate a group independent improvement in attention after 16 weeks of physical training.

**Keywords:** Motor learning, sport, motor cognition, cognitive function, health, Motor skills and abilities, Neural correlates

**Presentation type:** Poster Presentation

## Motor Control Benefits Short-Term Recall of Item-Outcome Associations

Maren Giersiepen <sup>1</sup>, Elif Gezen <sup>1\*</sup>, Simone Schütz-Bosbach <sup>1</sup>, Jakob Kaiser <sup>2</sup>

<sup>1</sup> *Ludwig-Maximilians-Universität München*, <sup>2</sup> *Nuremberg Institute for Market Decisions*

Sense of agency is the experience of control over actions and their outcomes. Recent investigations yielded inconsistent findings on whether the sense of agency facilitates recall or not. Ruiz et al. (2023) proposed that the sense of agency selectively benefits associative memory when goal-directed choices are involved. Agency-induced improvements in memory may be grounded in motor control. Following this, we examined whether motor control facilitates memory of item-outcome associations during reinforcement learning. In each trial, participants (N = 25) chose one of two targets and subsequently used a computer trackpad to steer a cursor to the selected target, followed by a positive (4-cent gain) or negative (2-cent loss) outcome. By learning which target was more rewarding, participants could maximize their monetary gain. We manipulated motor control in alternating blocks by disrupting cursor movement. Results show that participants' reaction times until target choice were significantly higher for the low motor control condition, potentially reflecting an increase in cognitive load. Participants showed similar learning of target-outcome associations for the low and high motor control conditions. In addition, during the associative memory task, participants' proportion of correct high-value target recognition was significantly higher than from chance level only for the high, but not the low motor control condition. Our findings indicate that high motor control benefits short-term performance in recalling item-outcome associations, potentially underlying agency-induced facilitation of associative memory during goal-directed behavior.

**Keywords:** motor control, sense of agency, associative memory

**Presentation type:** Poster Presentation

## **Am I in control? The dynamics of sensory information, performance feedback, and personality in shaping control experience**

Maren Giersiepen <sup>1\*</sup>, Nils Wendel Heinrich <sup>2</sup>, Annika Österdiekhoff <sup>3</sup>, Stefan Kopp <sup>3</sup>, Nele Rußwinkel <sup>2</sup>, Simone Schütz-Bosbach <sup>1</sup>, Jakob Kaiser <sup>4</sup>

<sup>1</sup> *General and Experimental Psychology, Faculty of Psychology and Educational Sciences, Ludwig-Maximilians-University Munich*, <sup>2</sup> *Institute of Information Systems, Department of Computer Science and Engineering, Universität zu Lübeck*, <sup>3</sup> *Social Cognitive Systems, Faculty of Technology, Bielefeld University*, <sup>4</sup> *Nuremberg Institute for Market Decisions, Nuremberg, Germany*

Sense of control (SoC) over our actions is crucial for regulating our behavior. SoC arises from low-level processes, such as immediate sensory feedback, and high-level processes, such as performance evaluation. Studies using simple, immediate action-effect tasks suggest that people rely more on sensory than on environmental cues of control. Yet, it remains unclear how these cues interact to shape the SoC in complex, goal-directed environments that require continuous behavioral adaptation. To investigate this, 50 participants performed a challenging motor control task akin to a video game, steering a spaceship along a pre-defined, continuously changing navigation path. Sensorimotor control was manipulated by varying task difficulty across experimental blocks. After each trial, participants received negative, non-informative, or positive feedback, followed by rating of their control experience. Linear mixed model analysis revealed that SoC decreased with increased task difficulty. Furthermore, independent of difficulty, negative feedback reduced the SoC whereas positive feedback enhanced it, with a stronger effect for negative feedback. Notably, the influence of negative feedback on SoC was greater among participants with higher depression scores, suggesting that generalized control beliefs modulate task-specific SoC. These findings indicate that SoC is informed by both low-level sensorimotor cues and external feedback, suggesting an integration of multiple types of information to infer control in dynamic task contexts where action-effect contingencies are extended over time. Crucially, the effects of task difficulty and feedback valence seem to vary with trait-like control beliefs, highlighting the need to account for individual differences when investigating situated control.

**Keywords:** Situated Action Control, Sense of Control, Performance Feedback

**Presentation type:** Poster Presentation

## **Colour Constancy in Virtual Reality Under Dual Illumination: Comparing Selection, Matching, and Adjustment Methods**

Raquel Gil Rodriguez \*, Natalia Pfening , Laysa Hedjar , Karl Gegenfurtner

*Justus-Liebig Universität Giessen*

This work studies colour constancy in virtual reality under two illuminants using three different methods: selection task, asymmetric matching, and achromatic adjustment. Results indicated that the selection task achieved the highest Color Constancy Index (CCI), highlighting its effectiveness in addressing colour constancy. In contrast, as reported by participants, the asymmetric matching task showed poor CCI performance, largely due to difficulty in achieving precise matches. The achromatic adjustment task showed consistent CCIs across different positions, suggesting stable performance in neutral and coloured illumination conditions.

The indoor scene setup includes a neutral light in the middle of the room and sunlight illumination coming through the glass windows. The 3D environment is rendered using Unreal Engine and visualised using the Varjo Aero headset. Characterization and measurements are conducted to ensure colour accuracy. There is a table in the room positioned to allow objects along it to be illuminated mainly by the outdoor light source, or by the neutral indoor light source.

In summary, the selection task emerged as the most reliable for assessing colour constancy, while other tasks faced usability and precision issues. These findings provide a basis for improving experimental designs to understand colour constancy mechanisms under complex lighting conditions.

**Keywords:** Virtual Reality, Colour Constancy

**Presentation type:** Poster Presentation

## Spatial Representation of the Calorie Magnitude

Emre Gurbuz <sup>1</sup>, Ahu Gokce <sup>2\*</sup>

<sup>1</sup> Department of Psychology, Saarland University, <sup>2</sup> Department of Psychology, Kadir Has University

Numeric and non-numeric magnitudes are often represented spatially. SNARC effect demonstrates association of smaller numbers with the left side and larger numbers with the right side. Such spatial representation extends beyond numbers, appearing in domains like stimulus size, musical tones, and brightness. The present study investigated whether such spatial representation would also hold for the calorie magnitudes, mapping low and high caloric values to different spatial locations. Previously we reported a lack of a space-calorie association however the current study was designed to address several limitations and investigate space-calorie association in terms of (in)congruent response mappings. In each trial, each target item (low or high-calorie stimulus) was presented centrally and its calorie magnitude was compared with a reference item with a medium calorie level. Trial congruency was established by associating low-calorie magnitude with the left and high-calorie magnitude with the right. Each low/high-calorie target item was presented twice and was responded with both left and right hands, enabling comparison of response time differences where an identical target was processed and responded by both hands. Although the results did not reveal a clear calorie and space association, the underlying mechanism of the spatial processing of calorie magnitude requires further examination. Understanding the space-calorie association could provide insights into how spatial representations influence perceptions of caloric content and potentially provide strategies to guide healthier food selection.

**Keywords:** SNARC effect, space-calorie association, calorie magnitude perception

**Presentation type:** Poster Presentation

## **Gaze-Pointer Distance as a Predictor of Quiz Performance in Video-Based E-Learning**

Raphaella Gonzalez <sup>\*</sup>, Tobias Wagner , Marian Sauter , Anke Huckauf

*General Psychology, Ulm University*

Effective signaling in e-learning, such as using digital pointers, can guide attention and improve learning. This study investigated how gaze behavior and the distance between gaze and pointer influence learning outcomes across three experiments. We first examined the relationship between gaze alignment with the pointer and quiz performance, finding that alignment reliably predicted performance (Experiment 1). Next, we evaluated the effects of signaling design, observing that precise synchronization of pointer movements with auditory content decreased gaze alignment and impaired performance predictions (Experiment 2). Finally, we demonstrated that gaze-pointer distance robustly predicts quiz performance in natural pointer conditions without forced synchronization (Experiment 3). These findings highlight gaze-pointer alignment as a critical factor in e-learning and underscore its potential for developing automated adaptive feedback systems to optimize learning experiences.

**Keywords:** Eye-tracking, e-learning, signaling, Performance prediction

**Presentation type:** Poster Presentation

---

## **Studying the Role of Visuospatial Attention in the Multi-Attribute Task Battery II**

Daniel Gugerell <sup>1\*</sup>, Benedikt Gollan <sup>2</sup>, Moritz Stolte <sup>1</sup>, Ulrich Ansorge <sup>1, 3, 4</sup>

<sup>1</sup> Faculty of Psychology, University of Vienna, 1010 Vienna, Austria, <sup>2</sup> Research Studios Austria, Vienna, Austria, <sup>3</sup> Vienna Cognitive Science Hub, University of Vienna, Vienna, Austria, <sup>4</sup> Research Platform Mediatized Lifeworlds, University of Vienna, Vienna, Austria

The MATB-II is a computer display task, which aims to measure human control operations on a flight console. Using the MATB-II and a visual-search task measure of spatial attention, we tested if capture of spatial attention in a bottom-up or top-down way predicted performance in the MATB-II. This is important to understand for questions such as how to implement warning signals on visual displays in human-computer interaction. To measure visuospatial attention, we used both classical

task-performance measures (i.e., reaction times and accuracy) as well as novel unobtrusive real-time pupillometry. A large number of analyses showed that: (1) Top-down attention measured before and after the MATB-II was positively correlated. (2) Test-retest reliability was also given for bottom-up attention, but to a smaller degree. As expected, the two spatial attention measures were also negatively correlated with one another. However, (3) neither of the visuospatial attention measures was significantly correlated with overall MATB-II performance, nor with (4) any of the MATB-II subtask performance measures. (5) Neither did pupillometry predict MATB-II performance, nor performance in any of the MATB-II's subtasks. Yet, (6) pupil size discriminated between different stages of subtask performance in system monitoring. This finding indicated that temporal segregation of pupil size measures is necessary for their correct interpretation, and that caution is advised regarding average pupil-size measures of task demands across tasks and time points within tasks. Finally, we observed surprising effects of workload (or cognitive load) manipulation on MATB-II performance itself, namely, better performance under high- rather than low-workload conditions.

**Keywords:** pupil dilation, eye-tracking, MATB-II, task demands, attention capture

**Presentation type:** Poster Presentation

---

## Activating the social processing mode during visual search: the additional singleton paradigm

Siddhima Gupta <sup>\*</sup>, Dirk Wentura

*Universität des Saarlandes*

In additional-singleton studies, visual search times are slower when an additional singleton is present as compared to when it is not. This finding tends to reflect that perceptually salient, but task-irrelevant stimuli capture attention. Recently, the additional-singleton paradigm has also been used with emotional faces (Glickman & Lamy, 2018): When participants search for a target face among a set of distractor faces based on a specific feature, and some trials contain an emotion distractor, search times tend to slow down due to the presence of the emotional singleton, indicating that emotional expressions capture spatial attention despite being task-irrelevant. We conceptually replicated this effect. In our experiment participants performed a face search for a uniquely tilted target and then categorized its gender (i.e., they had to perform a “social processing” task), with angry faces as singletons on half the trials. We found significant differences between singleton



present and singleton absent conditions. This conceptual replication was done in anticipation of a further experiment testing for the social processing mode hypothesis, where attentional bias towards an emotional stimulus is dependent on the activation of a social mode. Evidence for the social processing mode has been shown with the dot-probe paradigm, where the targets/instructions are manipulated to reflect a social or an asocial mode (Wirth & Wentura, 2018a; 2019; 2020). We discuss these findings in terms of replicability, as well as whether singleton effects appear when social features are task-relevant.

**Keywords:** visual search, additional singleton, social processing mode, emotional stimuli

**Presentation type:** Poster Presentation

---

## Is Optional Stopping Really No Problem for Bayesians?

Frieder Göppert \*, Linus Szillat , Sascha Meyen , Volker H. Franz

*Department of Computer Science, University of Tübingen, Tübingen, Germany*

Optional Stopping describes the practice to stop data collection dependent on properties of the data already collected. Such a practice can be especially beneficial when samples are costly. However, standard frequentist tests lose their error rate guarantees and optional stopping therefore can constitute a form of p-hacking. Bayesians, on the other hand, often argue that optional stopping is no problem for them (Rouder, 2014, *Psychonomic Bulletin & Review*). While these arguments are typically based on simulations with sampling from the specified prior, we investigated a real-world scenario where there exists a certain, fixed effect: Using a standard Bayesian t-test (which assumes a zero effect for  $H_0$  and a Cauchy distribution for  $H_1$ ) with optional stopping at pre-specified Bayes Factor thresholds (e.g. 1/3 and 3), we simulated data for true effects of different, fixed sizes. We then evaluated error rates: how often Bayesian optional stopping decides for  $H_0$  despite simulating from a non-null effect and how often it decides for  $H_1$  despite simulating from a null-effect. Notably, we find that for small non-null true effects the error rates of the Bayesian t-test are considerably higher than suggested by the critical Bayes Factor thresholds used for optional stopping. We therefore argue Bayesians (if they care about error rates) should actually be very cautious when applying optional stopping in combination with default priors, as used in the Bayesian t-test. This is so, because optional stopping could provide an exploitable opportunity to “hack” not only frequentist but also certain Bayesian tests.

**Keywords:** Optional Stopping, Sequential Testing, Bayesian, Bayes Factor, Hypothesis Testing, Bayesian t-test, Error rates

**Presentation type:** Poster Presentation

---

## **No Evidence for a Link between Self-Prioritization and Cognitive Control in Matching Judgments**

Felix Götz \*, Gesine Dreisbach

*University of Regensburg*

Recent research has shown that self-referential primes (e.g., MY) reduce conflict interference in conflict tasks (e.g., Stroop), suggesting that self-prioritization processes may enhance processes of cognitive control in general (e.g., Dignath et al., 2022). So far, however, this interaction effect has only been shown in situations where the self-referential information was added to a typical conflict task, i.e. in which the self-reference was *task-irrelevant*. The aim of the present study was to investigate whether the interaction would also extend to situations in which conflict stimuli were included in self-referential matching judgments, i.e. in which the self-referential information was *task-relevant*. To this end, we conducted three experiments using Eriksen-flanker stimuli in which the central and flanker letters ("H" vs. "S") were associated with either self-referential vs. other-/non-referential information ("I" vs. "STRANGER" in Experiment 1, "MY" vs. "THE" in Experiments 2 and 3). Critically, participants had to judge whether the central letter matched or mismatched the self-referential information (which was always presented above the central letter). In Experiment 3, the self- vs. non-referential stimuli were presented slightly before the Eriksen flanker stimuli, thus effectively priming participants with "MY" vs. "THE" before matching judgments were possible. In all three experiments, participants responded faster and with fewer errors in the self-relevant, congruent, and matching trials. In addition, self-prioritization effects were larger in matching vs. mismatching trials. Crucially, however, self-prioritization and congruency did not interact. Thus, the present research points to limitations of the proposed link between self-prioritization and cognitive control processes.

**Keywords:** Self-Prioritization, Cognitive Control, Conflict, Self-reference

**Presentation type:** Poster Presentation

## Do costs of prospective-memory tasks follow an ex-Gaussian distribution?

Fabian E. Gümüşdaglı <sup>1\*</sup>, Ute J. Bayen <sup>1</sup>, Jan Rummel <sup>2</sup>, Hanna Estelle Wahl <sup>1</sup>, Paula Fraustein <sup>1</sup>

<sup>1</sup> *Heinrich Heine University Düsseldorf*, <sup>2</sup> *Heidelberg University*

When striving to perform a prospective-memory (PM) task (i.e., remembering to perform an intended action), while concurrently performing an ongoing task, there are associated costs of PM (Smith, 2003). In laboratory experiments, these costs typically manifest as prolonged response times in the ongoing task. It has been proposed to investigate the underlying cognitive processes contributing to PM costs by modeling response times with an ex-Gaussian distribution (e.g., Ball & Brewer, 2018). It is assumed that the ex-Gaussian parameter  $\tau$  reflects periodic monitoring for the appearance of a PM target (Rummel et al., 2017). To put the validity of this interpretation to test, we conducted an experiment ( $N = 176$ ) with a standard laboratory event-based PM task and induced periodic monitoring by incorporating audio stimuli during the ongoing task that were similar to the PM cues. We included control groups who performed the ongoing task only, without PM instructions. We expected a positive effect of the audio manipulation on  $\tau$  only when participants performed the PM task in addition to the ongoing task. Contrary to our hypothesis, auditory stimuli had no effect on parameter  $\tau$  or the other ex-Gaussian parameters, although they did prolong response times. These findings suggest that periodic monitoring processes are not represented in the ex-Gaussian parameter  $\tau$ .

**Keywords:** prospective memory, prospective-memory costs, ex-Gaussian distribution, model validation

**Presentation type:** Poster Presentation

---

## Assessing the Reliability of Auditory Processing Tasks: A Systematic Review

Beyza Gündüz <sup>1\*</sup>, Tatiana Logvinenko <sup>2</sup>

<sup>1</sup> *Ludwig-Maximilians-Universität München*, <sup>2</sup> *Department of Child and Adolescent Psychiatry, Psychosomatics, and Psychotherapy, University Hospital, Ludwig Maximilian University of Munich*

Rise time and frequency discrimination tasks are used to examine auditory processing abilities, particularly in relation to the Temporal Sampling Framework, which emphasizes the importance of

temporal coding of sounds for language development (Goswami, 2011; Hämäläinen et al., 2014). Despite the significance, the psychometric properties of these tasks, such as test-retest reliability or internal consistency, are rarely reported. This systematic review aims to (1) map the available evidence on psychometric properties of rise time and frequency discrimination tasks, and (2) calculate weighted average estimates for test-retest reliability and internal consistency. Two separate searches were performed for each task via PubMed, using key terms related to tasks' names and areas of application. Titles and abstracts were screened using the Rayyan.ai platform, and we will further perform a full-text review to assess eligibility. Planned analyses include (1) describing studies' heterogeneity in sampling and experimental design; and (2) reporting the psychometric properties of tasks. A meta-analysis will be conducted if sufficient quantitative data are available for meaningful synthesis. At this stage, 1,915 identified studies were screened, with 166 preliminary deemed eligible. We aim to present extracted and analyzed data. It is expected that reliability estimates will often be underassessed and underreported in the eligible articles. We will discuss the overall psychometric quality of rise time and frequency discrimination tasks, consistency in their implementation, and methodological factors affecting their robustness. The study results will also address broader issues in experimental research related to replication crisis and reliability paradox in measurement.

**Keywords:** rise time, frequency discrimination, task reliability

**Presentation type:** Poster Presentation

---

## **In deep – An experimental study on the influence of ambient and character sounds in a simulator game**

Luise Haehn \*, Sabine J. Schlittmeier , Christian Böffel

*Work and Engineering Psychology, RWTH Aachen University*

Videogames attract a growing part of the world's population due to their multi-faceted gaming experience. This experience includes the subjective immersion, flow, avatar identification and fun as well as the player's perceived competence. The player's gaming experience can be influenced by many aspects of the game, especially sound design which has become more elaborate in recent years due to increased technical possibilities. Previous studies have examined different components of the videogame soundscape, in particular ambient and character sounds, in the multiplayer-online-battle-arena game League of Legends and discovered significant effects of

character sounds on the experienced immersion, avatar identification and fun. The present laboratory experiment investigated whether these effects could be replicated in a different game genre and thus generalized. Participants (N = 32) played the simulator game Loddlenaut in four different sound conditions consisting of the combination of ambient and character sounds turned on or off, respectively. After each game phase they filled out questionnaires about their gaming experience, specifically their experienced immersion, flow, avatar identification, fun and perceived competence. Analyses revealed significant effects of character sounds on flow and fun, as well as significant effects of ambient sounds on all collected aspects of the gaming experience. This indicates that different aspects of videogame sound, such as ambient or character sounds, may be of varying importance to the gaming experience depending on the game genre. The results are further discussed in view of their possible implications for the design of videogame soundscapes.

**Keywords:** Videogames, Ambient Sound, Character Sound, Immersion, Player Experience

**Presentation type:** Poster Presentation

---

## Event Completion: Causality Reduces Accuracy Without Affecting Metacognitive Efficiency

Simge Hamaloglu <sup>1\*</sup>, Markus Huff <sup>1, 2</sup>, Stephen Fleming <sup>3</sup>, Frank Papenmeier <sup>1</sup>, Nadia Said <sup>1</sup>

<sup>1</sup> *Department of Psychology, University of Tübingen; Schleichstr. 4, 72076 Tübingen, Germany,* <sup>2</sup> *Leibniz-Institut für Wissensmedien; Schleichstraße 6, 72076 Tübingen, Germany,* <sup>3</sup> *Centre for Human Neuroimaging, University College London; 12 Queen Square, London, UK*

Event completion refers to the phenomenon in which the brain fills in missing information in cases where sensory information is causally implied. However, it remains unclear if people recognize that such information is internally generated and whether it is accurate enough for reliable judgment. Research on event perception often uses accuracy and confidence to assess humans' perception. Yet, until now, there is no research investigating whether people have insight into the accuracy of their own judgments. As a first attempt to understand the confidence-accuracy relation in event perception, we analyzed existing data from an event completion study (Papenmeier et al., 2019) and replicated this experiment (N = 112). We used measures from Signal-Detection-Theory and calculated metacognitive efficiency, a bias-free indicator of the accuracy-confidence relation, for both experiments. Participants watched short soccer clips, followed by either a causal (e.g., seeing the ball flying) or non-causal sequence (e.g., cheering fans). They then decided whether they saw a critical ball contact, which was removed in half of the trials. They also rated their confidence in each

decision. We hypothesized a lower detection accuracy and metacognitive efficiency in the causal than in the non-causal condition. Results showed a lower detection accuracy in the causal compared to the non-causal condition, implying that event completion occurs. However, the metacognitive efficiency comparison did not reveal any differences across the causality conditions, for both experiments. These findings suggest that causality affects detection accuracy but does not improve metacognitive insight, highlighting limits in evaluating one's own judgments.

**Keywords:** event completion, metacognitive efficiency, confidence, Signal-Detection Theory

**Presentation type:** Poster Presentation

---

## The Effect of Auditory Distraction versus Actual Interruption on Listening Comprehension in a Virtual Reality Café

Mitra Hassanzadeh <sup>1\*</sup>, Florian Kattner <sup>1</sup>, Wolfgang Ellermeier <sup>2</sup>

<sup>1</sup> Health and Medical University, Potsdam, Germany, <sup>2</sup> Technical University of Darmstadt, Germany

Auditory distraction refers to cognitive impairment caused by task-irrelevant stimuli (e.g., background speech) that capture attention or interfere with cognitive processes, such as retention order of information in short-term memory. In contrast, interruption refers to a second relevant stimulus that stops an ongoing cognitive activity producing costs after resumption of the primary task. While both phenomena appear similar and are common in everyday environments, it is unclear whether they are based on the same mechanism (attentional capture). This experiment examines auditory distraction and task interruption effects on listening comprehension in a virtual reality (VR) scenario, offering greater ecological validity. In a virtual café, participants listened to a target avatar narrating a topic. In the interruption condition, a waitress avatar repeatedly addressed the participant with a question ("relevant speech"), whereas in the distraction condition, the waitress repeatedly addressed another computer-controlled avatar producing "irrelevant speech". In the silent condition, participants listened to the target avatar without interruptions or distractions. Following each of the 24 narrations on diverse topics, participants answered four-alternative questions about the spoken content. The narrations were a little over a minute long, and prepared to minimize participants' reliance on prior knowledge. Inspection of the incoming data suggests that the interruption condition causes the greatest attentional disruption, requiring more effort to refocus on main task. Performance appears to decrease in the order of interruption, distraction, and silent control. An analysis of the results from a total of 80 participants will be presented.

**Keywords:** Auditory interruptions, Irrelevant speech effect, Selective attention, Cognitive processes, Virtual reality, Speech comprehension

**Presentation type:** Poster Presentation

---

## **Applying the Diffusion Model to Visual Processing for Understanding Dementia Risk: Insights from the EPIC-Norfolk Cohort**

Tugba Hato <sup>1\*</sup>, Mischa von Krause <sup>1</sup>, Andreas Voss <sup>1</sup>, Stefan Radev <sup>2</sup>

<sup>1</sup> Heidelberg University, <sup>2</sup> Rensselaer Institute of Technology

The Diffusion Decision Model (DDM; Ratcliff, 1978) is a widely used framework in cognitive modeling, providing psychologically meaningful parameters such as drift rate, boundary separation, and non-decision time to understand decision-making processes. While traditionally applied to small experimental datasets, recent studies (e.g., von Krause et al., 2022) have demonstrated its potential in analyzing large-scale datasets, offering broader insights into decision-making at the population level. In this study, we aim to apply the DDM to the EPIC-Norfolk dataset (The EPIC-Norfolk Study, 2021), a large-scale dataset that provides a unique opportunity to examine the relationship between response time (RT) measures and dementia. The dataset includes data from 8,623 participants aged 48–92 years, with dementia diagnoses tracked over a 10-year follow-up period, during which approximately 5% of participants developed dementia. Participants completed the Visual Sensitivity Task (VST), a one-choice task designed to measure visual processing speed by detecting the presence of triangles. This data-driven study aims to employ the one-boundary DDM (Ratcliff & van Dongen, 2011) to investigate drift rate and its variability, as well as other key parameters, across demographic subgroups such as age and gender. This study is the first to use trial by trial VST in an older age group thus, combining cognitive modeling to this rich dataset will provide us unique information regarding general population and dementia.

**Presentation type:** Poster Presentation

## Age Simulation Effects on Full-Body Motor Sequence Learning

Anna Heggenberger \*, Janine Vieweg , Sabine Schaefer

*Saarland University*

Gross-motor sequence learning is fundamental for performing daily activities and maintaining independence across the lifespan. This study investigated how age and age simulation affect gross-motor sequence learning, focusing on acquisition, execution performance, explicit recall, and retention. 74 participants were divided into five groups: young adults aged 18-27 years without (n = 14) or with (n = 15) an age simulation suit, middle-aged adults aged 30-59 years without (n = 15) or with (n = 15) the suit, and older adults aged 60-86 years without the suit (n = 15). Participants in the suit condition wore the GERT age suit (Moll, 2021), which simulates age-related physical impairments by reducing sensory perception, flexibility, and strength. Participants performed a fixed 10-element gross-motor sequence task requiring full-body movements over 28 practice trials. Explicit sequence recall was assessed after acquisition, and a retention test was conducted on the following day. All groups demonstrated implicit sequence learning and maintained their performance levels from the end of acquisition to the retention test. However, young adults without the suit exhibited the fastest execution times and highest explicit recall scores. Notably, the suit significantly impaired execution performance and explicit recall in both younger and middle-aged adults, indicating that peripheral impairments can hinder explicit memory formation even when implicit learning remains intact. These findings highlight the significant impact of peripheral sensory-motor declines on motor sequence learning and memory formation across the adult lifespan. The results underscore the importance of considering both cognitive and sensorimotor factors in motor learning research.

**Keywords:** age simulation, motor sequence learning, whole-body movement, implicit and explicit memory

**Presentation type:** Poster Presentation



## The influence of sound for the interpretation of visual correspondence

Elisabeth Hein \*, Bettina Rolke , Meike Kriegeskorte

*University of Tübingen*

To perceive moving objects, we must associate them across space and time. This correspondence process is the basis for generating stable object representations and for structuring our environment. Using ambiguous apparent motion displays - in which different objects can be connected over time leading to different motion percepts - studies have shown that spatio-temporal as well as feature and semantic information are used to determine correspondence. The aim of our study was to examine whether a sound that is associated with a specific motion can influence correspondence. We used an ambiguous apparent motion display, in which two circular objects were presented in a first frame, followed by the same two objects shifted by one position to the side. Depending on how correspondence was solved, observers can either perceive both objects as moving together (group motion) or one object as moving (or "jumping") over the other (element motion). We presented either a sound that is associated with bouncing or a sound that is associated with rolling together with the visual apparent motion display. If the sound can influence correspondence, we expected observers to perceive more element motion with the bouncing sound and more group motion with the rolling sound. We found more element motion with the bouncing sound compared to no sound, but no other differences. We conclude that sounds can influence the interpretation of visual correspondence, but this effect is small and might only be present when the sounds perfectly match the visual percept.

**Keywords:** audition, vision, perceptual organisation, correspondence problem, apparent motion

**Acknowledgement:** This research was supported by DFG project HE 7543/1-2

**Presentation type:** Poster Presentation

## **Signaling as a context-dependent strategy in action control**

Lorena Hell <sup>1, 2\*</sup>, Christoph Geissler <sup>2</sup>, Philip Schmalbrock <sup>1, 2</sup>, Christian Frings <sup>1, 2</sup>

<sup>1</sup> *Department of Cognitive Psychology, Trier University, Germany*, <sup>2</sup> *Institute for Cognitive and Affective Neuroscience (ICAN), Trier University, Germany*

In sequential two-choice tasks, performance generally improves when both stimulus features and responses are repeated but deteriorates when only one repeats while the other changes (partial repetition). This interaction, commonly referred to as the stimulus-response binding effect, is attributed to the integration and retrieval of stimulus and response features into an episodic memory trace, which can interfere with current performance during partial repetition trials. An alternative explanation, the signaling account, suggests that response selection is influenced by a heuristic bias toward repetition or change, using the relationship between previous and current stimulus features as a response signal.

The present study examined whether the signaling heuristic is modulated by contextual information that, according to binding accounts, should not influence binding effects. Participants completed a sequential task where display set sizes varied within participants (Experiment 1, allowing display comparison) or between participants (Experiment 2, disallowing display comparison). Contrary to typical findings in two-choice tasks, binding effects were absent at small set sizes and only emerged at larger set sizes in Experiment 1, whereas results were consistent across set sizes in Experiment 2. These findings suggest that the signaling heuristic adapts to contextual information, incorporating environmental factors to adjust the use of stimulus information for response strategies.

**Keywords:** action control, signaling, stimulus-response binding, context, strategy

**Presentation type:** Poster Presentation

---

## **Individual Differences in Prospective Memory: Investigating Effects of Reasoning and Attentional Control on Cue Focality**

Wiebke Hemming <sup>\*</sup>, Kathrin Sadus , Jan Rummel

*Heidelberg University*

Fluid intelligence is known to correlate with various cognitive abilities, but its impact on prospective memory (PM), particularly in tasks with varying cognitive demands, remains largely unknown. In a

study with  $N = 178$ , we thus investigate how fluid intelligence and attentional control relate to PM. Participants performed a two-back task with words as the ongoing task and participants had to press a special key whenever rarely occurring PM cues were presented in the context of the two-back task. PM cue detection difficulty was manipulated by using either two specific words or two specific letters as cues. Fluid intelligence was assessed with the short form of the HeiQ, a validated figural matrix test, and attentional control was assessed with the Three-Minute Squared Test, which includes Stroop, Flanker, and Simon tasks. Data collection is ongoing, but preliminary analyses show a significant difference in PM performance, with participants performing better when cues are easier to-be-detected. Furthermore, a positive correlation between attentional control and PM performance was found for the difficult to-be-detected but not the easy to-be-detected cues. When data collection is finished, we intend to test the hypothesis that the relationship between fluid intelligence and PM is mediated by attentional control when PM cue detection is attention demanding.

**Keywords:** prospective memory, event-based, attentional control, intelligence, focality

**Presentation type:** Poster Presentation

## The effect of task interruptions on the performance in a typing task

Patricia Hirsch \*, Iring Koch , Andrea M. Philipp

*RWTH Aachen*

Typically, task interruptions have a negative effect on the performance in the interrupted task. In the present study, we examined the effects of task interruptions on the performance in a typing task. Participants were instructed to type German words. Task interruptions occurred between two syllables (e.g., JUN à interruption à GE) or within a syllable (e.g., JU à interruption à NGE). In Experiment 1, the interruption task was a numerical magnitude-categorization task, whereas in Experiment 2, there was no task during the interruption. In both experiments, we found worse performance for a letter following a task interruption than for the corresponding letter in a non-interrupted word. These resumption costs were smaller for task interruptions occurring between two syllables than for task interruptions occurring within a syllable. We discuss these findings in the in the framework of task-interruption and word-typing models.

**Keywords:** task interruptions, resumption costs

**Presentation type:** Poster Presentation

**Session:**

## **Qualitative and Quantitative Changes in Autobiographical Memories' Emotionality – The Role of Cognitive Reappraisal and Expressive Suppression**

Sophie Hoehne <sup>\*</sup>, Daniel Zimprich

*Department of Developmental Psychology, Institute of Psychology and Education, Ulm University,  
Albert-Einstein-Allee, 47, 89081 Ulm*

The emotional intensity associated with an event can change from its occurrence to its recollection. Most commonly, autobiographical memories of negative events decrease in emotional intensity over time (fading affect), but they can also remain the same (fixed affect) or increase in emotional intensity from event occurrence to event recall (flourishing affect). The present study sought to examine whether and how dispositional emotion regulation, specifically cognitive reappraisal and expressive suppression, relate to the direction (qualitative) and strength (quantitative) of perceived emotional changes in negative autobiographical memories. To this end, a group of younger (18-29 years) and older (60-87 years) adults (N =243) reported a total of 1221 autobiographical memories in response to negative event-cues and completed the Emotion Regulation Questionnaire (Gross & John, 2003). Results showed that emotional changes in participants' negative autobiographical memories were associated with individual levels of, in particular, cognitive reappraisal and, to a lesser extent, expressive suppression. Age interactions indicated that this was predominantly true for younger but not older adults. The findings highlight the value of also considering retroactive, that is, past-oriented, emotion regulation.

**Keywords:** Emotion Regulation, Autobiographical Memory, Emotional Change, Cognitive Reappraisal, Expressive Suppression, Two-Part Modelling

**Presentation type:** Poster Presentation

---

## **Adaptive information sampling in complex decisions from experience**

Linus Hof <sup>1\*</sup>, Julian Konstantin Schäfer <sup>1</sup>, Thorsten Pachur <sup>1, 2</sup>

<sup>1</sup> *Technical University of Munich*, <sup>2</sup> *Max Planck Institute for Human Development*

In experience-based risky choice, people can learn about the options' payoff distributions by drawing samples from them (ecological search). When the distributions' key properties are not directly represented in the sequence of samples, the cognitive system needs to further process the

samples to form such representations (cognitive search). The ecological search pattern (e.g., switching more or less frequently between options) imposes an initial organization on the samples, which can facilitate or complicate cognitive search by altering the number of processing steps required for a representation (transformation distance). Adapting one's ecological search to reduce the transformation distance might be most important when more complex choice ecologies impose higher processing costs. In a preregistered laboratory experiment ( $N_{\text{Participants}}=183$ ;  $N_{\text{Trials}}=7,320$ ), we tested whether participants adapted their ecological search to facilitate cognitive search in light of a given decision goal and choice ecology. Participants should choose either the option with better short-term or long-term rewards in choice problems of varying complexity (number of outcomes per option). The results show that ecological search shapes choice accuracy as predicted from differences in transformation distance: Participants who switched more were credibly better at identifying the short-term winner and worse at identifying the long-term winner. Moreover, participants' ability to correctly identify the short-term winner was more strongly associated with switching in complex problems. However, participants tended to switch infrequently overall, with little difference between decision goals and complexities, indicating limited adaptivity in ecological search.

**Keywords:** risky choice, decisions from experience, sampling, search, representation

**Presentation type:** Poster Presentation

---

## Word-Driven Cerebro-Acoustic Coherence in a Natural Language Comprehension Task

Jannika Hollmann <sup>1\*</sup>, Cosimo Iaia <sup>1</sup>, Alessandro Tavano <sup>1, 2</sup>

<sup>1</sup> *Institute of Psychology, Goethe University Frankfurt*, <sup>2</sup> *Department of Cognitive Neuropsychology, Max Planck Institute for Empirical Aesthetics*

We investigated the effects of word lexicality and word duration on neural tracking measured via cerebro-acoustic coherence. We reanalyzed a publicly available dataset (Brennan, 2023): Participants listened to an English audiobook version of the first chapter of *Alice in Wonderland* while brain activity was measured via EEG. We investigated cerebro-acoustic coherence for all spoken words, content words (open class), and function words (closed class) separately. To account for the effects of word duration on neural tracking, we used the Highest Density Regions (HDR; 30%, 60%, 90%) of the temporal distribution for all words, content words, and function words. We transformed each HDR into bandpass filters, which were applied after EEG preprocessing.

Cerebro-acoustic coherence was calculated separately for all words, content words, function words, and each respective filter. We found significant cerebro-acoustic coherence for content words in the high-theta and low-theta band while for function words exclusively in the high-theta band. The theta rhythm previously assumed to track especially syllables seems therefore also track words and therefore neural tracking may reflect attention to more than one unit of speech.

Brennan, J. R. (2023). *EEG datasets for naturalistic listening to "Alice in Wonderland"* (Version 2) [Data set]. University of Michigan - Deep Blue Data. <https://doi.org/10.7302/Z29C6VNH>

**Keywords:** neural tracking, speech perception, word type, coherence, EEG

**Presentation type:** Poster Presentation

---

## Development of eyemovements in reading from first to fifth grade

Josefine Horbach \*

*Department of Psychological Assessment and Intervention; Institute of Psychology; RWTH Aachen University, Germany*

Reading and writing are skills that influence each other but can be disordered separately. The cognitive profile of children with isolated reading deficit (RD), isolated spelling deficit (SD) or the combined disorder (RSD) appears to differ, potentially leading to different reading strategies. How the development of the reading learning process takes place in these groups is still unclear. The aim of the study was to compare the development of eye movements of children with RD, SD, RSD from first to fifth grade and to draw conclusions about underlying reading strategies. Data of five measurement points, grades 1-5, from 192 children were retrospectively evaluated and analysed. Of 21 children with RSD, 20 children with RD, 19 children with SD and a control group of 22 children, 13 temporal, spatial and proportional eye movement parameters and their development were analysed.

The eye movement parameters landing position, gaze time and fixation duration develop differently in the groups. While children with RD in second grade pursue an integral reading strategy, the reading strategy of children with RSD remains segmental throughout. However, the integral reading strategy requires frequent repetitions, which is why the reading time does not differ from the RSD group and is similarly slowed down.

The results of the eye movement analysis confirm the existence of a dissociation in reading and writing and show different reading strategies in the three disorder groups.

**Keywords:** Eyemovements, reading strategies, longitudinal, reading profiles

**Presentation type:** Poster Presentation

---

## **Category Learning is Relational: An evidence accumulation model in self-regulated category learning**

Ann-Katrin Hosch <sup>1\*</sup>, Janina A. Hoffmann <sup>2</sup>, Markus Janczyk <sup>1</sup>, Bettina von Helversen <sup>1</sup>

<sup>1</sup> *University of Bremen*, <sup>2</sup> *University of Bath*

How do humans learn categories? In most cases, categories are learned in relation to one another. In a recent paper (Hosch, Hoffmann, & von Helversen, 2024, JEP:LMC), we used a self-regulated category learning task to investigate this in more detail. As variability is a defining feature of categories, we manipulated the variability of two categories (i.e. the focal and the counter-category) and participants sampled exemplars until they felt confident to have a representation of the categories. Briefly, we observed evidence for an increasing sample size with increasing category variability.

We here propose and explore a model that aims to capture this relational learning process with an evidence accumulation model. In the model, the variability of the focal category contributes to the rate of evidence accumulation, while the counter-category variability modulates the boundary at which the learning process ceases. The rate of evidence accumulation either remains at the same expected value or diminishes with an increasing number of sampled exemplars. Variability was mapped to parameters either linearly or using an entropy measure to capture the nature of the perceptual stimulus variability.

We hypothesize that categories are learned either discriminatively, by contrasting the focal category's variability with the counter-category's variability, or assimilatively, where the focal category's variability level aligns with that of the counter-category. Our findings reveal that an assimilation process best fits the data in this task, underscoring the relational nature of category learning.

**Keywords:** Category learning, variability, evidence accumulation model

**Presentation type:** Poster Presentation

---

## **Can we try harder to become more accurate? Evidence from dart performance**

Lynn Huestegge \*, Isabel Stein

*University of Wuerzburg*

Try harder instructions are known to improve performance in a variety of basic cognitive and motor tasks. A signature finding is a reduction of response times, sometimes (but not always) at the expense of overall accuracy. Such try harder effects are typically conceptualized in terms of a transient recruitment of spare cognitive capacity. Here, we test whether try harder instructions may also improve accuracy in a situation without substantial time constraints. To overcome limitations of accuracy measures derived from dichotomous right/wrong tasks, we resorted to assessing dart throwing performance. Participants were instructed to target the bulls eye throughout the experiment. In some mini-blocks, they were instructed to try harder. Additionally, we assessed a control group without any try harder instructions. Overall, results revealed a lack of try harder effects on accuracy, suggesting that while spare mental capacity can be recruited to improve temporal aspects of task processing, a corresponding increase of task focus does not in the same way help to improve response precision.

**Keywords:** try harder, motor control, response accuracy, effort

**Presentation type:** Poster Presentation

---

## **(Absence of an) Effect of the availability of environment distance cues on biases in visual time-to-contact estimation for approaching vehicles**

Thirsa Huisman \*, Daniel Oberfeld-Twistel

*Johannes Gutenberg Universität Mainz*

When estimating the arrival time (time-to-contact, TTC) of vehicles (and objects in general), people often show biases. The size-arrival effect describes that shorter TTCs are estimated for larger vehicles, compared to smaller vehicles with the same actual TTCs. Similarly, many studies showed that people estimate longer TTCs for faster vehicles, compared to slower vehicles with the same actual TTCs, i.e., they tend to estimate longer TTCs when at the time of estimation the vehicle is further away (distance bias). Here, we varied the availability of distance cues in an interactive VR environment. A cue-rich city scene contained buildings, regularly spaced lampposts, pavement tiles,



and street markings, and thus multiple environment distance cues. In contrast, a cue-poor endless-parking-lot environment consisted of only black unmarked asphalt, without any markings to aid in distance perception. We expected both biases to be reduced in the cue-rich environment where more distance cues were available to accurately estimate distance and velocity. Cars of two sizes (scaling factor 1:1.35), travelling at 10, 30 or 50 km/h, were presented on a head mounted display with head tracking. Participants estimated the vehicles' TTCs in a prediction-motion task. We did not observe a size-arrival effect in any of the two environments, likely due to the limited size difference. The results showed the expected effect of velocity on TTC estimation (distance bias) in both environments. However, while the effect was descriptively stronger in the cue-poor environment, the difference between the two environments was not significant.

**Presentation type:** Poster Presentation

---

## Temporal Uncertainty in Visual Search

Alisa Höflinger <sup>1\*</sup>, Ulrich Ansorge <sup>1, 2, 3</sup>

<sup>1</sup> *Faculty of Psychology, University of Vienna, Austria*, <sup>2</sup> *Vienna Cognitive Science Hub, University of Vienna, Austria*, <sup>3</sup> *Research Platform Mediatized Lifeworlds, University of Vienna, Austria*

Visual search clearly benefits from knowledge about relevant features. However, despite substantial evidence that stimulus timing also affects visual search performance, the effect of temporal certainty on visual search processes, and especially on distractor suppression, remains unclear. Can distractors be suppressed more effectively if we know when to expect them? Considering temporal positions as feature-like information, we examine temporal influences by varying temporal certainty of visual stimuli in a conjunction search experiment (N=40). Participants search for a red vertical bar among four differently orientated, colored bars, or have to suppress the red vertical bar and, instead, search for a non-red vertical bar. The target display is preceded by a cueing display - proactive processing is expected to result in shorter (search condition; due to facilitation) or longer (suppression condition; due to suppression) reaction times in trials in which the red cue and the target are presented at the same position compared to different-position trials.

We evaluate the impact of temporal certainty by implementing two different types of trial blocks; with certain (100 ms or 200 ms) or uncertain (mixed) cue-target intervals. Temporal certainty is hypothesized to result in stronger cueing effects (i.e., facilitation or suppression, depending on condition) of same-position vs. different-position cues compared to temporally uncertain trials. Results are discussed in light of current theories and constitute significance for central aspects of everyday life, by revealing the impact of temporal certainty on attention control.

**Keywords:** visual search, attentional template, temporal certainty, distractor suppression

**Presentation type:** Poster Presentation

---

## Maintaining object files at saccadic speeds

Melis Ince <sup>1, 2\*</sup>, Carolin Hübner <sup>3</sup>, Martin Rolfs <sup>1, 2</sup>

<sup>1</sup> *Department of Psychology, Humboldt-Universität zu Berlin, Germany*, <sup>2</sup> *Berlin School of Mind and Brain, Humboldt-Universität zu Berlin, Germany*, <sup>3</sup> *Department of Psychology, Technische Universität Chemnitz, Germany*

Saccadic eye movements induce rapid shifts of objects on the retina. This motion is routinely omitted from conscious perception and may thus present challenges for maintaining the perceptual continuity of objects across the movement. Here, we present initial results from an ongoing study in which we test how object movement at saccadic speeds (while the eyes fixate) affects object continuity in an object reviewing paradigm (Kahneman et al., 1992; Sasi et al., 2023). Trials started with a preview display, in which we presented single digits inside two Gabor patches. The patches then either moved continuously (slowly or at saccadic speed) or suddenly jumped to a new location, or they remained static throughout the trial. Finally, to probe object continuity, a target digit appeared in one of the two Gabors, which participants had to identify as quickly as possible. The target could either be one of the previewed digits (from the same or the different object), or a new digit altogether (no-match trials). We replicated the previously observed Object-Specific Preview Benefits (OSPBs)—shorter reaction times (RTs) when identifying a target previously seen in the same object compared to a new digit or a digit seen in the different object. These OSPBs were evident in the static condition compared to no-match trials, while not significant for any of the motion conditions. This preliminary result suggests that OSPBs are influenced by object movement, but further evidence is needed to understand whether they can keep up with the rapid speeds of saccadic motion.

**Keywords:** Object-specific preview benefits, OSPB, Object files, motion perception, saccadic speeds, object continuity

**Presentation type:** Poster Presentation

---

## Assessing Participants' Knowledge about the Distribution of Real-World Quantities

David Izydorczyk \*

*University of Mannheim*

When people estimate quantities of real-world objects (e.g., caloric content) Brown and Siegler (1993) proposed that they rely on their metric knowledge (among other things) to do so. Metric knowledge is defined as knowledge about the statistical properties of a domain and the quantity being estimated, such as the mean, variance, as well as the form of the distribution, which is distinct from knowledge about individual objects. Multiple studies have shown exposure to numerical facts about a domain can enhance people's metric knowledge and estimation accuracy—a phenomenon known as the seeding effect. However, existing measures of metric knowledge typically rely on item-wise deviations between true and estimated values, which fail to capture participants' understanding of the overall distribution. To address this limitation, I developed a novel task that intuitively and flexibly assesses participants' knowledge of a domain's full distribution. In an initial experiment, participants estimated the distributions of two real-world quantities (calories in food items and days until sexual maturity in mammals). They then received numerical information about a subset of items and were allowed to revise their distributions. Results revealed that on average participants initially exhibited limited knowledge of the true distributions but were able to update their understanding in a normative manner following exposure to the numerical facts. These findings provide a promising approach to studying distributional knowledge and its role in estimation accuracy.

**Keywords:** real-world quantities, estimation, metric knowledge, distributions, seeding

**Presentation type:** Poster Presentation

---

## Why does the Irrelevant Speech Affect Cognitive Performance: The Role of Phonological Processing?

Abdullah Jelelati <sup>1\*</sup>, Maria Klatte <sup>1</sup>, Thomas Lachmann <sup>1, 2</sup>

<sup>1</sup> *University of Kaiserslautern-Landau*, <sup>2</sup> *Universidad Nebrija Madrid*

In the Irrelevant Speech Effect (ISE), to-be-ignored background speech firmly attenuates visual-verbal serial recall performance. The changing-state account (CSA) proposes that the ISE results

from sound-induced impairments of the serial rehearsal process that participants use to maintain the item sequence. In a series of experiments, we explored the role of rehearsal in the ISE and we found that rehearsal intensity correlated with ISE magnitude: the more rehearsal, the stronger the effect. We believe that rehearsal might be an indicator of the intensity of phonological processing because rehearsal works when visual presentations are translated into phonological representations. In a following study, we investigated the ISE in a phonological processing task that did not require serial order retention and strongly discouraged a rehearsal strategy. Our results showed that processing phonological information was impaired by the presence of irrelevant speech. These findings invited further investigation using, however, different tasks and measuring tools. In the current experiment, participants are to perform an n-back task that prompts phonological processing strategies while irrelevant speech is played in the background. As a control condition, we are creating non-shapes or non-letters that are hard to verbalize or name. An n-back task requires online monitoring, updating, and manipulation of remembered information, allowing us to measure accuracy, reaction time, and stress level. We argue that a greater effect of irrelevant speech will be found in the n-back task that requires phonological processing.

**Keywords:** Irrelevant Speech Effect, phonological processing, n-back

**Presentation type:** Poster Presentation

---

## **Adaptive processing In word production: Evidence from picture-word-interference studies**

Jörg D. Jescheniak \*, Stefan Wöhner  
*Leipzig University*

Adaptive lexical processing is a prominent concept in theories of speech production. Current models include a mechanism that operates after each naming episode and makes words that are semantically related to a selected target word less accessible for future retrieval. Jescheniak et al. (2023) found that semantic interference in the picture-word interference (PWI) task (which is assumed to reflect the activation of competitor words to a target word) was reduced across repeated naming of a picture, even when novel distractor words were used, in line with the notion of adaptive lexical processing. Here, we present three new PWI experiments, all of which replicate this finding and show that the reduction of semantic interference contrasts with the non-reduction of phonological facilitation when semantic and phonological distractor conditions are counterbalanced,

is also found when distractors are presented visually rather than auditorily, is replicated with different materials, and occurs in a continuous manner. This provides further support for the notion of adaptive lexical processing and demonstrate that the PWI task is an appropriate tool for investigating it.

**Keywords:** language; word processing; word production, speech production, semantic processing

**Presentation type:** Poster Presentation

---

## Assessing time-on-task changes in cognitive control and vigilance components in a dual task

Amelie C. Jung <sup>1\*</sup>, Fernando G. Luna <sup>1, 2</sup>, Rico Fischer <sup>1</sup>

<sup>1</sup> *University of Greifswald, Germany*, <sup>2</sup> *University of Córdoba, Argentina*

Cognitive control (e.g., interference control) appears to be susceptible to time-on-task effects, i.e., there are fluctuations in the level of interference control over time. In two previous dual-task studies conducted in our lab, interference control assessed by the backward crosstalk effect (BCE) decreased with increasing time-on-task (Fischer et al., 2018; Jung et al., unpublished). Similar time-related changes have been observed in vigilance processes, known as the vigilance decrement (e.g., Mackworth, 1948). However, the relationship between reduced cognitive control and vigilance decrement remains unclear (Luna et al., 2022). Therefore, we aimed to assess time-on-task decrements of cognitive control, as assessed by changes in the BCE, simultaneously with a vigilance decrement, as assessed with an adapted ANTI-Vea task (Luna et al., 2021), in the same paradigm. In the dual task (60% of the trials), participants responded to the direction of two central arrows (i.e., the targets) appearing above (Task 1) and below (Task 2) the fixation point. In addition, executive vigilance (EV) trials (20%) required participants to detect a salient vertical displacement of the target in Task 1, while the remaining 20% of arousal vigilance (AV) trials involved stopping a millisecond counter as quickly as possible. Although the BCE in dual-task trials did not increase with time-on-task, we observed a Task 1-Task 2 performance trade-off over time, which was accompanied by a significant executive vigilance decrement, as is typically observed in the standard ANTI-Vea. The present outcomes motivate to further examine the relationship between cognitive control and vigilance loss across time-on-task.

**Keywords:** cognitive control, vigilance decrement, time-on-task, BCE

**Presentation type:** Poster Presentation

## **Spectator effects on the performance of soccer-specific tasks**

Christian Kaczmarek \*, Sabine Schaefer

*Saarland University, Institute of Sport Sciences*

Sports are often performed in front of an audience, which can help or hinder motor performance. Strauss (2002) argues that tasks which require strength, endurance and speed should profit, while tasks that require coordination should suffer when spectators are present (for a recent review, see van Meurs et al., 2022). Soccer consists of a mixture of motor abilities (e.g. coordination, speed), so spectator effects may be difficult to disentangle in real-world scenarios.

In a repeated measures design, 27 soccer players (age =  $19.1 \pm .7$  years) performed a timed dribbling parcours (coordination, speed) and a 30-m sprint (speed). A subsample of participants also juggled a ball (coordination). Every participant completed the tasks alone, in front of others (4 to 5 team members), and in the presence of a group of 7 virtual spectators. The virtual spectators were projected onto a screen as a video, and the participants were informed that they were being observed live. Data were analysed with repeated-measures ANOVAs with spectator condition as independent variable, for each task separately.

Spectator effects were only observed for the sprint task, with participants running faster when being watched by their team members. The presence of spectators had no influence in the dribbling parcours and the juggling task. This indicates that spectator effects may require a real audience, and may be larger for tasks that require speed than for pure coordination tasks and tasks combining coordination and speed. Future research needs to replicate these effects in larger samples, and across different sports.

**Keywords:** Social Facilitation, Spectators, Motor tasks

**Presentation type:** Poster Presentation

## **EGEFACE: A Novel Approach Using Dynamic Stimuli for Measuring Individual Differences in Face Memory**

Murat Karataş <sup>1\*</sup>, Sonia Amado <sup>2</sup>, Elif Yüvrük <sup>3</sup>, Aycan Kapucu <sup>2</sup>

<sup>1</sup> *Bursa Technical University, Department of Psychology, Bursa, Türkiye*, <sup>2</sup> *Ege University, Department of Psychology Izmir, Türkiye*, <sup>3</sup> *Mugla Sıtkı Kocman University, Department of Psychology, Mugla, Türkiye*

Face memory is an essential cognitive ability for social interactions, yet individuals show considerable variation in this skill. This study presents the development of EGEFACE, a face memory test designed to address limitations of existing assessments by integrating features such as static and dynamic stimuli, adjusting difficulty using a face recognition algorithm, and including both target-present and target-absent trials to reduce response bias. EGEFACE employs ROC analysis to evaluate face memory accuracy independent of response bias. EGEFACE was developed using a newly constructed database of faces and calibrated across three difficulty levels using similarity scores derived from a face recognition algorithm. Data from 703 participants, collected in two stages, demonstrated acceptable internal consistency and split-half reliability. Moderate correlations with the CFMT+ suggest EGEFACE assesses similar cognitive processes, while weaker correlations with the KFMT indicate it captures distinct aspects of face recognition. High performers in EGEFACE achieved scores comparable to super recognizer level on the CFMT+, whereas low performers showed minimal overlap with prosopagnosic-level scores. These findings indicate that EGEFACE has the potential to serve as a useful tool for assessing individual differences in face memory, offering an alternative to existing tests while addressing some of their limitations.

**Keywords:** Face memory, unfamiliar face recognition, EGE Face Memory Test

**Presentation type:** Poster Presentation

## Exploring the motivational basis of the illusion of control with a control heuristic questionnaire

Karoline Karsten <sup>1\*</sup>, Christine Blech <sup>2</sup>, Robert Gaschler <sup>2</sup>, Dorit Wenke <sup>1</sup>

<sup>1</sup> PFH Private University of Applied Sciences, <sup>2</sup> FernUniversität in Hagen

The illusion of control refers to the phenomenon of feeling in control over an outcome that is not caused by our action (e.g. gambling). But how can we misinterpret our level of control? According to Thompson et al. (2004), we use a control heuristic that is based on our intention to achieve a desired outcome when assessing how much control we have. To better understand the motivational basis of illusions of control, we developed a self-report questionnaire operationalizing the different aspects of intentions proposed by Thompson et al. (2004). Exploratory factor analyses (N = 322) of the 36 items revealed a four-factor structure with the dimensions “generative intention to produce a desired outcome”, “preventive intention to avoid an aversive outcome”, “systematicity” and “involvement”. First validation results involving (a) the different facets of intention, (b) experimentally induced illusions of control, and (c) other relevant measures such as different kinds of control beliefs, will be presented and discussed.

### Reference:

Thompson, S. C., Kyle, D., Osgood, A., Quist, R. M., Phillips, D. J., & McClure, M. (2004). Illusory Control and Motives for Control: The Role of Connection and Intentionality. *Motivation and Emotion*, 28(4), 315–330. <https://doi.org/10.1007/s11031-004-2386-0>

**Keywords:** control illusion, control heuristic, intentionality

**Presentation type:** Poster Presentation

---

## The interplay between proactive and reactive control within and between tasks

Eldad Keha <sup>1, 2\*</sup>, Andrea Kiesel <sup>3</sup>, Elisa Straub <sup>3</sup>

<sup>1</sup> Hebrew University of Jerusalem, <sup>2</sup> Achva Academic College, <sup>3</sup> University of Freiburg

Cognitive control, essential for goal-directed behavior, is typically divided into proactive and reactive systems. Proactive control is a preparatory, anticipatory process, where individuals actively maintain goal-relevant information to optimize performance. In contrast, reactive control is a just-in-time



mechanism, triggered in response to unexpected events or conflicts. Investigating the interplay between proactive and reactive control is critical, as it can illuminate how these systems co-regulate behavior and adapt to varying cognitive demands. We conducted two experiments to explore this relationship. In the first experiment, we tested for transfer effects from proactive in the color-word Stroop task to reactive control in a Gender Stroop task. Proactive control was manipulated by altering the proportion of neutral, congruent, and incongruent trials, aiming to influence the congruency sequence effect (CSE), a marker of reactive control. Despite using both a between-subject and a within-subject design, we did not observe any transfer effects, indicating that manipulating proactive control did not influence reactive adjustments in this context. In the second experiment, we examined proactive control's influence on reactive control within a Prime-Probe Stroop task. Here, we confirmed the presence of the CSE in a Stroop paradigm free from confounds such as feature repetition and contingency learning. Notably, our findings showed that increasing proactive control led to a reduction in the CSE, suggesting that proactive engagement can attenuate reactive control processes. These results underscore the complexity of cognitive control dynamics, suggesting that while proactive and reactive systems may interact, their relationship is limited to within-task interaction.

**Keywords:** Cognitive control , Conflicts, Stroop task, Congruency sequence effect

**Presentation type:** Poster Presentation

---

## Evidence against central timing mechanism in temporal-order perception

Paul Kelber \*, Rolf Ulrich  
*University of Tübingen*

What determines the precision with which humans perceive the temporal order of events? Many theoretical models assume that temporal precision is limited by a central timing mechanism that compares the arrival time of incoming signals independent of peripheral events. This assumption was heavily inspired by early reports that temporal-order judgments are made with same precision for various intramodal and intermodal stimulus pairs. Experiment 1 tested whether intra- and intermodal judgments converge to a common threshold, at least after extensive practice. Five subjects performed 20 sessions of intramodal (two lights) and intermodal (light and tone) judgments in a ternary-response task, which allows a confound-minimized estimation of the thresholds. Critically, the intermodal temporal-order threshold was significantly higher than the intramodal temporal-order threshold across the entire practice curve. Nonetheless, it is conceivable that

peripheral cues contribute to intramodal judgments, while the assumption of a stimulus-independent central processor still applies to intermodal judgments. Experiment 2 therefore tested whether stimulus intensity affects the intermodal temporal-order threshold. Specifically, 10 subjects performed five sessions of intermodal judgments in a ternary-response task, with light and sound being either dim and soft (low intensity) or bright and loud (high intensity). For most subjects, the intermodal temporal-order threshold decreased significantly with stimulus intensity. Taken together, both experiments provide evidence against the assumption that temporal precision is determined by a central timing mechanism that operates independently of peripheral events. This challenges many theoretical models of temporal-order perception.

**Keywords:** temporal-order judgment, simultaneity judgment, time perception

**Presentation type:** Poster Presentation

---

## **The Cognitive Processes Underlying Stereotype Threat In Gender-Stereotyped Domains: A Diffusion Model Analysis Of Information Uptake And Response Tendencies**

Kim Keller <sup>\*</sup>, Mischa von Krause , Andreas Voss

*Heidelberg University*

Stereotypes contribute to performance differences as negative stereotypes can be perceived as threatening, like the threat of being judged negatively or inadvertently confirming the stereotypes. When stereotypes are made salient, the stereotyped groups perform worse in many academic and non-academic domains. The primary goal of this study was to determine which cognitive processes underlie Stereotype Threat. 307 men and 305 women were asked to complete a series of trials, either a mean estimation task or an emotion recognition task. Half of the group was told that we were interested in their perceptual abilities. The other half was informed that we are testing their mathematical abilities or emotion recognition skills and that we were interested in gender differences. Additionally, they were asked to indicate their gender before performing the task. The manipulation in the second group revealed differences in reaction times but not in accuracy for women in mathematical tasks in the Stereotype Threat condition. A diffusion model analysis revealed higher thresholds for women in the Stereotype Threat condition but no substantial differences in drift rate. The results suggest that more liberal decision criteria and more cautious response patterns are induced by Stereotype Threat. The lack of difference in drift rates indicates

no changes in working memory capacity, as many previous studies have suggested. This is an important step in explaining Stereotype Threat and preventing the impact of negative stereotypes on marginalized groups.

**Keywords:** Stereotype Threat, Drift Diffusion Model, Gender Stereotypes

**Presentation type:** Poster Presentation

---

## **Costs of cue-task mapping relearning are not smaller in task repetitions than in task switches**

Stefanie Kellner <sup>1, 2\*</sup>, Tilo Strobach <sup>1, 2</sup>, Mike Wendt <sup>1, 2</sup>

<sup>1</sup> *Department of Psychology, Medical School Hamburg, Hamburg, Germany*, <sup>2</sup> *ICAN Institute for Cognitive and Affective Neuroscience, Medical School Hamburg, Hamburg, Germany*

In the task cueing procedure, participants perform two tasks in varying sequences, with distinct cues indicating the relevant task on each trial, allowing us to investigate associative processes during task set reconfiguration. In previous experiments with this procedure, remapping the cue-task assignment after initial practice yielded a performance cost that was larger in task switch trials than in task repetition trials, compared to replacing the cues with novel ones. However, this research could not distinguish task switch costs from cue switch costs. We applied a 4:2 mapping between cues and tasks to separate task switch costs from cue switch costs by analyzing only data from trials associated with a cue switch. After an initial practice phase, we exchanged two cues between tasks in a final transfer phase, resulting in two types of cues: exchanged and constant. Exchanging cues between tasks impaired performance in trials featuring an exchanged cue compared to trials featuring a constant cue. Moreover, performance impairment was not smaller in task repetition trials than in task switch trials. This was the case even when only examining task switch trials featuring a switch of cue type matched with task repetition trials that were always associated with a cue type switch. These results suggest a broader impact of disrupted associative processes, extending beyond task set reconfiguration mechanisms. While the exact mechanisms driving these effects remain elusive, the findings underscore the importance of further investigating the dynamics of altered cue-task associations by considering the type of cues across different trial types.

**Keywords:** Task Switching, Cognitive Control

**Presentation type:** Poster Presentation

## **Deep pressure stimulation (DPS) increases positive feelings and reduces stress: Evidence from wearing T-shirts with integrated weights**

Tina Sarlak , Carl Scriba , Conrad Bolte , Patrick Khader \*

*Charlotte-Fresenius University of Psychology*

It has been repeatedly reported that deep pressure stimulation (DPS), often applied through weighted blankets, has the potential to reduce feelings of anxiety and stress. Building on these observations, we developed a paradigm to transfer this effect to everyday situations by examining the impact of weighted clothes, specifically T-shirts with integrated pads of varying weights (placebo, light, heavy), on well-being and stress perception. Over several days, participants wore these T-shirts and completed standardized questionnaires (i.e., PANAS, PSQ, BSQ, and WHO-5) in an experimental setting in which the different weights and the sequence of wearing them was varied systematically in a combined longitudinal and cross-sectional design. We found an overall effect of wearing those T-shirts on positive emotionality (as measured by the PANAS-P) as well as body-related anxiety (as measured by the BSQ), with significantly increased positive emotions, but reduced anxiety. Interestingly, the lightweight pads demonstrated the strongest effect, compared to the placebo pads (having hardly any weight) and the heaviest weights (that the participants probably felt uncomfortable with after a longer time of wearing them). These findings suggest that moderate DPS using light weights in everyday objects may be an effective method for improving general well-being by increasing positive emotionality and reducing stress and anxiety. These findings provide important insights for developing low-threshold interventions aimed at stress management and emotional regulation in everyday contexts. Future studies should further delineate the specific therapeutic effects of weighted objects in everyday situations as well as possible long-term outcomes of the intervention.

**Keywords:** Deep pressure stimulation, emotion, anxiety, stress, weighted objects

**Presentation type:** Poster Presentation

## How the Sausage is Made: LLM-embedding-based Heuristic Hierarchical Clustering For Organizing TeaP2025 Talk & Poster Sessions

Seung-Goo Kim <sup>1\*</sup>, Daniela Sammler <sup>1, 2</sup>

<sup>1</sup> *Research Group Neurocognition of Music and Language, Max Planck Institute for Empirical Aesthetics, Frankfurt am Main, Germany,* <sup>2</sup> *Department of Neuropsychology, Max Planck Institute for Human Cognitive and Brain Sciences, Leipzig, Germany*

Organizing talks and poster presentations into scientifically coherent sessions is non-trivial at a large scale. Motivated by recent applications of large language models (LLMs) in topic extraction and clustering of scientific literature, we were interested in whether an LLM could reduce human efforts (e.g., ~40 HIWI-hours) at a reasonable cost (e.g., <1 USD) for this very conference, TeaP2025.

We developed a semi-automated procedure that exploits abstract-embedding vectors generated by an LLM to perform iterative hierarchical clustering. This approach aims to find optimal cluster structures that obey the physical constraints of the conference (e.g., a maximal number of talks per session; the number of parallel sessions; the number of lecture rooms) while maximizing the utilitarian utility (i.e., a linear sum of individual utilities) of attendees and presenters (i.e., minimizing conflict of parallel talk sessions; maximizing coherence of adjacent posters).

The results suggest that an LLM-based algorithm can produce better-than-nothing groundwork. However, it still requires considerable post-processing from human experts. We conclude that LLM-based tools are not a magic wand but can be helpful to some extent when combined with human expertise.

**Keywords:** human-machine-interaction, LLM

**Presentation type:** Poster Presentation

## Poisson or Gaussian? Evaluating Signal Detection Models with Empirical Memory Data

Adrian Klabunde \*

*Former Master's Student at Christian-Albrechts-Universität zu Kiel From 1st December 2024:  
Member of Europa-Universität Flensburg (Institute for Digital Education) in cooperation with the  
Leibniz Institute for Science and Mathematics Education (IPN), K*

**Background:** The Gaussian Equal Variance Model (GEVM) from Signal Detection Theory (SDT) is a widely used approach to modeling recognition tasks (Hautus et al., 2019). However, it fails to account for the asymmetric Receiver Operating Characteristics (ROCs) frequently observed in empirical data. As an alternative, the Poisson Model of Signal Detection (PMSD) has been proposed (Egan, 1975; Kaernbach, 1991). This study aimed to evaluate the PMSD's fit and its potential advantages over the GEVM in the Visual Sensory Memory Task (VSMT; Kaernbach et al., 2019).

**Methods:** Stimulus presentation time and size were systematically varied in the VSMT. Participants provided old-new judgments and confidence ratings, which were used to estimate model parameters via Maximum Likelihood Estimation. Log-Likelihood Ratio Tests were conducted to compare the PMSD, GEVM, and a full parameter model.

**Results:** The PMSD demonstrated statistically significant superiority over the GEVM in only 2 out of 56 comparisons. However, in 68% of the analyses, the PMSD represented a valid parameter reduction compared to the full parameter model, highlighting its parsimony without significant loss of fit.

**Discussion:** While systematic evidence for the PMSD's superiority over the GEVM remains limited, the results indicate that the PMSD could offer an interesting and interpretable alternative for modeling recognition tasks. Future research should further explore its applicability across different experimental paradigms and task variations.

**Keywords:** Signal-Detection-Theory, Poisson, Receiver-Operating-Characteristic, Maximum-Likelihood

**Presentation type:** Poster Presentation

## **Priming of Potential Road Hazards: Effects on Reaction Time in a Visual Search Task**

Karsten Klaffer \*, Mark Vollrath

*Technische Universität Braunschweig, Institute of Psychology, Department of Traffic and Engineering Psychology*

Early detection of road hazards is crucial for accident prevention, requiring efficient visual search due to capacity limitations in the visual system. During visual search, priming can be utilized to reduce search times by creating a guiding template in working memory, optimizing attention deployment. In many cases, drivers need to visually search areas of the driving scene for road hazards. For hazard perception, priming has so far only been examined for road signs and threat campaigns, but not for the visual search for potentially dangerous objects, on a more general level. Therefore, this study examines whether priming can accelerate the visual search for potential road hazards. In an online experiment with 72 participants, four primes (text warning, symbol warning, scene picture, target picture) were used in a visual search for five targets (pedestrian, cyclist, car, road sign, roadway). Reaction time until finding the target was measured via a button press. All primes led to a reduction in search time compared to the control condition. Visual primes (symbol warning, target picture) were more effective than semantic primes (text warning, scene picture). For the visual primes, search time was shorter when the visual features between the prime and target matched more closely. Driver characteristics did not influence priming effects. The results are consistent with theories on visual search and hazard perception. Thus, priming can be used to accelerate hazard perception and could be implemented in modern vehicles with in-car displays. Future research should explore dynamic scenarios and the role of visual features.

**Keywords:** hazard perception, priming effects, visual search, driver attention, traffic safety

**Presentation type:** Poster Presentation

## **Abnormal frontal theta phase dynamics in the EEG as a marker for impaired cognitive control in mental disorders**

Ingo Klaiber \*, Carlos Schönfeldt-Lecuona , Markus Kiefer

*University of Ulm, Department of Psychiatry and Psychotherapy III, 89075 Ulm*

Various mental disorders are associated with cognitive impairments affecting everyday life. When comparing patients with major depressive disorder (MDD) and schizophrenia (SZP), different severity levels of cognitive deficits can be observed. On electrophysiological level, different characteristics of frontal midline theta oscillations including inter-trial phase clustering (ITPC) were associated with initiating effective cognitive control. ITPC represents the consistency of phase angles of oscillatory processes over trials and time points. Therefore, the aim of our study was to quantify cognitive deficits in MDD and SZP and link them to the ITPC of theta-range oscillations. Hence, forty-one MDD, thirty-two SZP and respectively matched healthy controls (HC) performed two experimental tasks (Go/NoGo, Eriksen flanker) while an electroencephalogram (EEG) was recorded. In comparison to the other two groups, SZP showed worse performance (accuracy, reaction times) in both tasks. Whereas, there was no difference between MDD and HC. Considering the EEG data, an universal modulation of ITPC in conflicting conditions (NoGo trials, incongruent trials) compared to non-conflicting conditions (Go trials, congruent trials) was only evident on a numerical level. However, compared to the other two groups, SZP showed a lower overall condition-unspecific ITPC in both tasks. Again, a significant difference between MDD and HC was absent. Taken together, these results could be interpreted within the dysconnectivity hypothesis of schizophrenia because performance deficits and changes of ITPC were unique to SZP but absent in MDD. Second, these phase synchrony disruptions in SZP underlines the relevance of an intact theta phase-synchronized information transfer to recruit cognitive control resources.

**Keywords:** theta oscillations, phase coherence, depression, schizophrenia, cognitive syndrome

**Presentation type:** Poster Presentation



## **Haptic neglect during actions with spatially incompatible effects**

Yanick Kloß \*, Wilfried Kunde

*Julius-Maximilians-Universität Würzburg*

In the sense of ideomotor theories, actions are controlled by the anticipation of their environment- and body-related effects. For some actions (e.g., when using a tool with a lever), these effects are incompatible, e.g., in the spatial domain. Recent evidence suggests that the interference posed by spatially incompatible action effects can be overcome by downregulating body-related effect codes, as reflected by reduced tactile sensitivity in the effector shortly before action initiation. This study posed a critical test of the haptic-neglect hypothesis by maximizing participants' need to downregulate body-related effect codes. Participants moved a digital tool (i.e., a cursor) from the center of a circle to one of 8 potential directions by moving their finger on a textured surface in either the exact same direction (compatible) or in the exact opposite direction (incompatible). Shortly before (~100ms) or after movement initiation (~100ms), they received tactile stimulation of different intensities on their active hand in 89% of the trials. Before movement onset, we observed reduced tactile sensitivity in the effector, as reflected by lower  $d'$  and higher detection thresholds in incompatible compared to compatible movements.

**Keywords:** Action control, ideomotor theory, haptic neglect

**Presentation type:** Poster Presentation

---

## **Lost Connections: How Depression Alters Memory Performance and Strategy Use**

Luisa Knopf \*, Madlen Hölter , Siri-Maria Kamp

*Trier University*

Depression is associated with memory impairments and deficits in executive function. These two factors may be connected, such that depressed individuals, due to dysexecutive symptoms, may struggle to use effective encoding strategies, leading to diminished memory performance.

In our study, 21 patients currently experiencing moderate to severe depression and 20 age-matched control participants engaged in a memory task. In the first block, without mention of any specific strategy, they were asked to encode word pairs and subsequently completed an associative

recognition task. Subsequently, they were asked to retrospectively report any mnemonic strategies they had applied. In the second block, participants were instructed to constructing a sentence using the words from each pair, as an effective associative encoding strategy.

The depressed participants exhibited significantly poorer item and associative memory performance and were less likely to report effective mnemonic strategy use after block 1, compared to the control group. However, both groups benefited comparably from the encoding strategy, leading to improved associative memory performance in block 2. Furthermore, subjective ratings regarding their ability to construct sentences with each word pairs did not differ between the groups. In conclusion, our study highlights the detrimental impact of depression on both item and associative memory performance, particularly in the context of impaired executive functions. However, similarly to non-depressed individuals, depressed patients can effectively utilize instructed mnemonic strategies to improve their memory performance.

**Keywords:** Depression, Memory, Strategy Use

**Presentation type:** Poster Presentation

---

## **Positionsspezifische Persönlichkeitsmerkmale im Eishockey: Zur Passung von Persönlichkeit und Verhalten**

Jale Köseoglu , Patricia Graf , Dirk Koester \*

*BSP Business & Law School*

Für erfolgreiche Mannschaftssportarten ist die optimale Besetzung jeder Spielposition, also eine optimale Verhaltensvorhersage, herausfordernd. Für die Kaderplanung fehlen oft spezifische Angaben zu den psychologischen Anforderungen, während die physische und technisch-taktische Anforderungskriterien weitgehend klar definiert sind. Um die Vorhersagemöglichkeit des individuellen (Spiel-)Verhaltens und der optimalen Mannschaftsleistung zu verbessern, untersuchte diese Studie psychologische Merkmale von Eishockeyspielern bezogen auf ihre Spielpositionen. Dafür wurden zehn Hochleistungssportler (Spieler der ersten Bundesliga) getestet. Im Rahmen eines Mixed-Methods-Ansatzes wurden die Persönlichkeitsmerkmale der Spieler erfolgte unter Anwendung des „NEO-Fünf-Faktoren-Inventars“ und des „Competitive Index-Revised“ (Wettstreitorientierung; Koester & Land, 2019) erfasst. Zusätzlich wurden zehn problemzentrierte Interviews mit denselben Spielern durchgeführt (Auswertung nach Kuckartz & Rädiker, 2022). Die Ergebnisse verdeutlichen, dass die psychologischen Anforderungen je nach Spielposition deutlich

variieren und somit positionsspezifisch differenziert betrachtet werden sollten. Erwartungskonform wurden signifikant erhöhte Werte in der Wettbewerbsorientierung,  $t(9) = 3.44$ ,  $p = .004$ ,  $d = 1.09$ , speziell ‚Freude am Wettkampf‘,  $z(9) = 51.5$ ,  $p = .008$ ,  $d = 0.87$ ) sowie in den Big-Five-Persönlichkeitsdimensionen im Vergleich zur Gesamtbevölkerung festgestellt (z. B. Extraversion  $t(9) = 4.26$ ,  $p = .001$ ,  $d = 1.34$ ; Gewissenhaftigkeit  $t(9) = 2.46$ ,  $p = .018$ ,  $d = .780$ ) während Neurotizismus geringer ausgeprägt war,  $t(9) = -1.84$ ,  $p = .049$ ,  $d = -0.584$ ). Entgegen der Erwartung zeigt ‚Offenheit für Erfahrungen‘ keinen erhöhten Wert. Die Ergebnisse der Interviews stützen teilweise die quantitativen Ergebnisse, erweitern sie aber auch für spezifische Positionsanforderungen, bspw. Für die Torwartposition (vs. Feldspielerpositionen). Ein fundiertes Verständnis der psychologischen Positionsanforderungen kann zur Optimierung der Kaderzusammenstellung und sportlichen Leistung beitragen.

**Keywords:** motorische Kontrolle, Persönlichkeit, Kognition, Sport

**Presentation type:** Poster Presentation

---

## Perceived emotional intensity influences hindsight bias in emotion recognition

Nadine Koller \*, Dingrong Guo , Yee Lee Shing

*Goethe-University Frankfurt*

Hindsight bias is the phenomenon where people overestimate their original knowledge after outcome information is available. It was found in various domains and is known to be very hard to eliminate. However, despite extensive research on hindsight bias, this phenomenon in emotion recognition remains underexplored. Giroux et al. (2022) conducted a pioneering study, where participants first identified emotions as blurry faces clarified (foresight phase) and later recreated their recognition point after seeing the clear image (hindsight phase). They showed that participants exhibited hindsight bias for various emotions, except for happiness. The aim of our study was to replicate the findings of Giroux et al. (2022) for happy, sad, fearful and surprised faces using the same blurry-face procedure. We also tested how the perceived intensity of emotions and individual differences in depression and anxiety symptoms might influence hindsight bias. We could not replicate the pattern observed by Giroux et al. (2022); participants in our study recalled their original judgements quite accurately across all emotions. However, when considering the perceived intensity of emotions, participants showed hindsight bias for fearful and surprised faces rated as

having low to medium intensity. Further, we found a significant link between depression scores and stimulus identification points, but it did not result in hindsight bias. In sum, our study sheds light on the complexities of hindsight bias in emotional recognition, highlighting the importance of emotional intensity in influencing this bias.

**Keywords:** hindsight bias, emotional recognition, emotional intensity

**Presentation type:** Poster Presentation

---

## **Increasing response alternatives reduces the adverse impact of urgency on cognitive control**

Anika Krause <sup>1, 2\*</sup>, Christian H. Poth <sup>2</sup>

<sup>1</sup> *Differential Psychology, Personality Psychology and Psychological Assessment, Department of Psychology, Bielefeld University, Germany*, <sup>2</sup> *Neuro-Cognitive Psychology, Department of Psychology, Bielefeld University, Germany*

Cognitive control is a crucial prerequisite for goal-directed behavior: It ensures that one can act driven by one's own intentions, even in conflict situations in which stimuli from the environment trigger conflicting behaviors. Cognitive control is influenced by urgency. In urgent situations, goal-driven behavior has been found to be temporarily overpowered by stimulus-driven behavior. Participants performed actions dictated by stimuli, even against their intentions. All previous studies investigated the effect of urgency on cognitive control in experiments with only two response alternatives. The number of response alternatives is a major determinant of reaction times and errors in manual cognitive tasks. Therefore, we ask whether an increase in response alternatives may influence how urgency affects cognitive control. Results revealed that the urgency-evoked dominance of stimulus-driven behavior is specific for tasks with two response alternatives. In contrast, when there are four response alternatives, the effect of urgency on cognitive control was severely reduced: Thus, increasing the task complexity in terms of response alternatives helps to maintain goal-driven behavior in the face of urgency.

**Presentation type:** Poster Presentation

## **Interpreting pointing gestures: The role of direct and indirect speech**

Lisa-Marie Krause <sup>1\*</sup>, Cornelia Ebert <sup>2</sup>, Stefan Hinterwimmer <sup>3</sup>, Sebastian Walter <sup>2</sup>, Oliver Hebert <sup>1</sup>

<sup>1</sup> *Julius-Maximilians-Universität Würzburg*, <sup>2</sup> *Goethe-Universität Frankfurt*, <sup>3</sup> *Universität Hamburg*

When people repeat a spoken statement, they can either use a more descriptive (indirect speech) or a more depictive form (direct speech). Both forms of reported speech are often combined with pointing gestures to guide attention or clarify a statement. However, it is unclear how the choice of reported speech form affects the understanding of a pointing gesture. We hypothesized that a gesture accompanied by an indirect statement is generally understood as indicating the object at which the speaker points. In contrast, the same gesture accompanied by direct speech can be understood as a bodily quotation, and hence, the receiver might adopt the perspective of the cited person. To test this, an experimenter and a participant sat opposite to each other, with a movie poster behind each of them. The experimenter told a short story about a student who used to sit in the participant's chair. At the end, the experimenter repeated a statement by the student about his favorite movie – either in direct or indirect speech – while always pointing to the poster in front of him. Participants were then asked to name the student's favorite movie and rate their confidence in their answer. Generally, most participants chose the poster the experimenter pointed at, regardless of the condition. Moreover, we found that the confidence ratings were not affected by the form of reported speech. These findings suggest that pointing gestures are perceived as informative in the way that they directly indicate an object regardless of the reported speech form's intention.

**Keywords:** Pointing, Gestures, Communication, Deixis

**Presentation type:** Poster Presentation

## Reading out latent visual working memory representations from MEG using stochastic resonance

Noa Krause <sup>1\*</sup>, Megan Howard <sup>2</sup>, Rosanne Rademaker <sup>1</sup>

<sup>1</sup> *Ernst Struengmann Institute for Neuroscience in Cooperation with Max Planck Society, Frankfurt am Main, Germany*, <sup>2</sup> *Institute of Cell Biology and Neuroscience, Goethe University Frankfurt, Frankfurt am Main, Germany*

The sensory recruitment hypothesis posits that frontal brain regions recruit early visual cortex (EVC) for high-fidelity representations during visual working memory (VWM). Strong support for this hypothesis comes from observations that VWM contents can be decoded from EVC with fMRI. However, delay period decoding is not typically found in electro- and magnetoencephalography (MEEG) studies. We hypothesize that this discrepancy emerges because frontal regions recruit EVC via subthreshold feedback that modulates synaptic thresholds but not firing, thereby driving robust decoding from fMRI but not MEEG signals. In this MEG study, we aim to make subthreshold feedback visible by exploiting stochastic resonance – a noise benefit in non-linear systems. Specifically, sub-threshold information (e.g., feedback) can become supra-threshold (e.g., translated into firing) by injecting just the right amount of noise. This supra-threshold signal is patterned by the current state of the system (e.g., VWM contents), making it available for read-out. Here, participants (N=11) remembered an orientation while EVC was activated by noise images shown throughout a 2s delay. Noise strength was manipulated by varying noise contrast across trials. Preliminary results show significantly enhanced VWM decoding when weak noise (<18% Michelson contrast) is presented during the delay, compared to baseline. In line with the idea of stochastic resonance, this implies that subthreshold feedback to EVC can be uncovered with a resonant amount of noise. With this ongoing study, we further hope to introduce a viable method to improve read-out of VWM using MEEG, and bridge the gap with fMRI findings.

**Keywords:** MEG, visual working memory, decoding, visual cortex, feedback

**Presentation type:** Poster Presentation

## **Feature-dependent perception of auditory apparent motion in normally sighted and visually impaired people**

Meike Kriegeskorte <sup>\*</sup>, Elisabeth Hein

*University of Tübingen*

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 a short break (ISI), after which two more stimuli are presented, one at the centre and one shifted to the right. This display is ambiguous, as depending on which stimuli are connected, two different types of motion can be perceived. Which percept is seen can be influenced by the ISI and the stimulus features, as stimuli that are closer together in time or more similar in features are more likely to be connected. The Ternus effect exists not only in the visual, but also in the auditory domain. The auditory percept is also dependent on the ISI and on the feature information, but the feature effect is much smaller. To investigate, whether the size of the feature effect might be due to the visual modality being more important to us, we compared the feature bias in normally sighted with visually impaired people. We expected that for visually impaired people the feature effect might be larger as the auditory modality is more important to them and more trained. Our results showed descriptive differences between both groups, suggesting that the visual ability might influence feature-dependent perception in auditory apparent motion.

**Keywords:** Apparent motion, auditory perception, visual ability

**Presentation type:** Poster Presentation

---

## **Exploring the effect of 3D vs. 2D lineups on eyewitness identification accuracy using Virtual Reality**

Ulrike Kruse <sup>1, 2\*</sup>, Kristina Suchotzki <sup>1</sup>, Stefan R. Schweinberger <sup>2</sup>

<sup>1</sup> *Philipps-Universität Marburg*, <sup>2</sup> *Friedrich-Schiller-Universität Jena*

In addition to the commonly used 2D photographs of suspects presented to eyewitnesses (Weinert, 2015), law enforcement agencies are increasingly employing various forms of 3D imagery. For instance, the Tokyo police uses 3D photographs of arrested individuals since 2016 (BBC, 2016).

Thus, the application of 3D images in lineup procedures seems only a question of time. Previous studies have indicated that interactive lineups provide advantages over static 2D photo lineups (e.g., Colloff et al., 2021, 2022). Building on these findings, our study examined the effect of 3D versus 2D lineups on eyewitness accuracy within a between-subject design, employing a more ecologically valid virtual reality crime scenario. A sample of  $N = 116$  participants first viewed a 360° video with two perpetrators committing a mock theft, followed by two sequential lineup sessions, two days later. Contrary to previous studies, our results revealed no significant differences in identification accuracy between 3D and 2D formats. This may be due to the more ecologically valid crime scenario presentation. However, we also hypothesize that the lack of interactive control over the 3D images could explain the absence of an effect. Unlike previous research, our participants were only exposed to 3D faces presented in a fixed time-loop video format. Our findings suggest that the advantage of 3D lineups over 2D may rely more on the ability to control viewing perspective than on the added depth information (cf., Zeng et al., 2020). This hypothesis will be explored in future research.

**Keywords:** eyewitness identification, lineup, three-dimensional, virtual reality

**Presentation type:** Poster Presentation

---

## **Balancing Effectiveness and User Experience in Light Cue Design: Enhancing Situation Awareness in Conditional Automated Driving.**

Kerstin Kuhlmann \*, Philipp Hantelmann , Mark Vollrath

*Technische Universität Braunschweig*

Take-over situations can be a safety risk in conditional automated driving. It is therefore important to support the driver during take-overs. A major problem is the driver's lack of situation awareness. To improve situation awareness, a previous study compared four different light cues aiming to guide the drivers' gaze towards important areas. The results showed that light cues can direct the driver's gaze to relevant areas. However, the most effective variant was not the one with the best user experience. Based on the pre-study results, an adapted variant was developed to provide a better user experience while remaining effective. This follow-up study compares the adapted version with a variant with better user experience than other variants from the pre-study. In a driving simulator,  $N = 25$  participants experienced four highway scenarios, encountering both light cue variants twice. Usability ratings were collected after each trial. In addition, a post-session interview was conducted. Neither the usability ratings nor the interview revealed differences in preference between the two



variants. However, the participants described different aspects that they (dis-)liked about the variants. Thus, there seems to be no superior variant in terms of user experience. However, the results show that the adaptation of the effective variant enhanced the user experience as it reached comparable levels to the control variant. Our findings provide valuable insights for the design of light cues in conditional automated driving, emphasizing the need for solutions that are both functional and user-friendly to enhance drivers' situation awareness in critical situations.

**Keywords:** automated driving, take-over requests, light cues, usability, driver attention, situation awareness

**Presentation type:** Poster Presentation

---

## Using the visual world paradigm to examine the gender representations evoked by the generic masculine versus the glottal stop form

Joanna Kullik \*, Anita Körner , Ralf Rummer

*University of Kassel, Institute of Psychology, General Psychology*

In many languages, the masculine form of nouns referring to persons has a dual function. It can refer to both, male persons and persons of all genders (generic masculine). Many experiments have demonstrated that even the generic masculine (e.g., die Bürger) leads to a male bias, i.e., readers or listeners predominantly think of men. In written German, various strategies of gender-aware language have been proposed to reduce this bias (e.g., Lehrerinnen, Lehrer:innen\*); in spoken German, a form that separates the word stem from the female suffix by a glottal stop is used (e.g., Lehrer?innen).

To investigate the influence of the glottal stop form compared to the generic masculine on the cognitive representation of gender, we applied the visual world paradigm. In each experimental trial, a picture of four persons (two male and two female) was presented while an auditory text including a generic masculine noun or a glottal stop form was played. Based on the eye-mind hypothesis, we assumed that participants focus their gaze on persons they have in mind when hearing the sentences. By measuring dwell times on the depicted persons, we drew conclusions about gender representations elicited by different gender forms.

Our results revealed a significant difference between the conditions. In both conditions, female individuals received more attention than male individuals. However, the glottal stop form elicited a stronger female bias ( $t(139)=-1.86$ ,  $p=0.032$ ,  $d=-0.31$ ). These findings suggest that the glottal stop form enhances the representation of female individuals compared to the generic masculine.

**Keywords:** gender aware language, language processing, generic masculine, glottal stop, general psychology, eyetracking, visual world paradigm

**Presentation type:** Poster Presentation

---

## **Predicting memory usage in continuous naturalistic behaviour**

Levi Kumle <sup>1, 2\*</sup>, Joel Kovoov <sup>1</sup>, Amy X. Li <sup>1</sup>, Amelia G. Rock <sup>1</sup>, Ellen Jones <sup>1</sup>, Emily Hesselink <sup>1</sup>, Anna C. Nobre <sup>3</sup>, Dejan Draschkow <sup>1, 2</sup>

<sup>1</sup> *Department of Experimental Psychology, University of Oxford, Oxford, United Kingdom*, <sup>2</sup> *Oxford Centre for Human Brain Activity, Wellcome Centre for Integrative Neuroimaging, Department of Psychiatry, University of Oxford, Oxford, United Kingdom*, <sup>3</sup> *Wu Tsai Institute and Department of Psychology, Yale University, New Haven, USA*

Working memory (WM) and its capacity have been extensively studied in controlled tasks, where information is briefly presented and followed by a memory probe. In contrast, real-world environments often allow sensory information to remain accessible, letting individuals choose between relying on external sensory inputs or using memory representations. Interestingly, WM usage in such natural settings is lower than expected from traditional capacity estimates. Further, existing studies reveal considerable variance in how much participants engage WM naturally, but little is known about whether this reflects stable individual differences or what factors influence natural WM usage. Here, using two independent datasets from studies utilising an object copying task in VR, we demonstrate that individual differences in WM usage are stable across time and task context. Next, in a preregistered study (n=100), we investigate two potential predictors of natural WM use: WM capacity and attentional control. Participants completed an VR object copying task to assess WM usage, and three WM span and attentional control tasks. Both WM capacity and attentional control independently predicted natural WM usage. Our approach represents the first systematic exploration of factors determining natural memory reliance in complex behaviour, showing how benchmarks of cognitive function relate to everyday cognitive engagement.

**Keywords:** working memory, natural behaviour, virtual reality, individual differences

**Presentation type:** Poster Presentation

## **The role of visual imagery in face recognition: Drift diffusion modeling reveals differences in individuals with and without imagery abilities - implications for the use of online studies in aphantasia**

Varg Thore Königsmark <sup>1, 2\*</sup>, Max-Philipp Stenner <sup>1, 2</sup>, Reshanne R. Reeder <sup>3</sup>, Elena Azañón<sup>1,2</sup>

<sup>1</sup> *Otto von Guericke University, Medical Faculty, Magdeburg, Germany*, <sup>2</sup> *Leibniz Institute for Neurobiology, Magdeburg, Germany*, <sup>3</sup> *Department of Psychology, Institute of Population Health, University of Liverpool, Liverpool, UK*

The absence of voluntary visual imagery, termed aphantasia, offers a unique lens to investigate the role of visual imagery in various cognitive processes, including face recognition. Given its low prevalence (2–4%), many studies increasingly rely on online experiments to recruit adequate sample sizes. In this study, we compared two age- and gender-matched cohorts of aphantasics and typical imagers using a face recognition paradigm with one cohort tested in-lab and the other online. Findings based on recognition accuracy reveal differing results between the cohorts. While the lab-based sample shows significant benefits for imagery in recognition accuracy, particularly when faces were presented inversely, these benefits were less pronounced in the online cohort. To explore this further, we fitted a hierarchical drift diffusion model to our data, allowing us to examine decision-making processes in greater detail. Across collapsed cohorts, we observe more decisive evidence accumulation, i.e., higher drift rates, for the imagery group. Additionally, intra-cohort differences emerged in boundary separation, reflecting the degree of caution exhibited during decision-making. Imagers tested in the controlled lab-environment, along with aphantasics from both online and lab settings, demonstrated consistent decision-making patterns. In contrast, the online imagery group relied on smaller amounts of evidence, resulting in shorter response times and lower recognition accuracy compared to the other three groups. our findings highlight the importance of addressing motivational factors influencing participation commitment and implementing methodological adaptations when conducting online research, particularly in the context of neurodivergent populations, and ensuring the appropriate selection of control groups.

**Keywords:** Visual imagery, aphantasia, face recognition

**Presentation type:** Poster Presentation

## **Beyond Dual Tasks: Investigating Task-order Coordination in Triple-Task Situations**

Sebastian Kübler \*, Torsten Schubert

*Martin-Luther-Universität Halle-Wittenberg*

Dual-task (DT) situations require additional task-order coordination processes, which are essential for planning, executing, and monitoring the sequence of task processing. These processes rely on an order representation, known as the task-order set, which contains explicit information about the sequence of tasks and is activated during DT processing. Evidence supporting this assumption comes from the observation that, in DT situations with a random task order, performance is typically improved in trials where the task order is repeated (same-order trial) compared to those with a reversed order (different-order trial) relative to the preceding trial. To date, order coordination has only been investigated in multitasking situations involving two tasks. As a result, it remains unclear whether order-set-based control processes are also necessary when performing more than two tasks. To address this question, we conducted five experiments using a novel triple-task paradigm. The applied triple task consisted of two visual and one auditory choice reaction time tasks which were presented in variable order. In all five experiments, we observed improved performance in same-order trials compared to different-order trials. This improvement was evident in task 1, task 2, as well as task 3. These results suggest that order-set based coordination processes are also involved in the processing of more than two tasks. The implications of these findings for future research will be discussed.

**Keywords:** dual task, triple task, PRP paradigm, task-order coordination, executive functions, cognitive control

**Presentation type:** Poster Presentation

---

## **Stimulus-driven and response-driven cross-modal action co-activation**

Jens Kürten \*, Lynn Huestegge

*University of Würzburg*

Coordinating multiple effectors, such as the eyes and hands, is essential in many daily activities. While using two effectors simultaneously is typically more demanding than using one (dual-action

costs), a prepotent action (e.g., a saccadic eye movement) can interfere with the isolated execution of another response (e.g., a manual keypress). This interference often manifests as frequent false-positive responses in the non-required but prepotent effector. This study examined whether such responses are primarily stimulus-driven (automatically triggered by a suitable stimulus) or response-driven (dependent on a concurrently executed, highly compatible action). Participants responded to a peripheral visual stimulus with (a) a single saccade, (b) a single keypress, (c) both, or (d) no action. Faster saccades in dual-action trials compared to single-saccade trials, and equally fast manual responses in single- and dual-action trials (i.a. absence of dual-action costs), indicated difficulties in separating responses. Critically, false-positive saccades (keypresses) occurred more often in single-manual (single-saccade) trials than in no-action trials, with a stronger tendency for false-positive saccades compared to keypresses overall. These findings suggest that response-driven co-activation between highly compatible actions can complement automatic stimulus-driven activation in generating (unwanted) behavior.

**Keywords:** multiple action control, motor interference, cross-modal action

**Presentation type:** Poster Presentation

---

## Guiding drivers towards safer driving speed: Exploiting visual dominance in speed adaptation

Anna-Lena Köhler <sup>1</sup>, Iring Koch <sup>2</sup>, Stefan Ladwig <sup>1\*</sup>

<sup>1</sup> RWTH Aachen University, Institute for Automotive Engineering (ika), <sup>2</sup> RWTH Aachen University, Institute of Psychology (IfP)

Inappropriate speed is a main cause of accidents. Drivers are often unaware of potential risks due to inadequate speed. To prevent dangerous situations, we need to understand perceptual factors influencing human speed perception. Due to the prominent role of vision in driving, we examined the effect of visuo-spatial stimuli on speed based on the optic flow. While developing an adaptive infrastructure measure to reduce speed, we conducted two consecutive studies, a driving simulator study and a field test to investigate findings further. In both studies, we placed lights on two sides of a highway exit and either illuminated them statically or activated them in a way that they appeared to be moving towards the driver. We expected drivers to slow down more when seeing static light stimuli compared to a baseline without lights. We also expected drivers to decrease speed more in conditions with oncoming lights compared to a baseline, and to static lights, due to distorted speed perception. The first study in a static driving simulator revealed no difference between conditions. In

the field test, both static lights and lights moving towards the driver led to a speed reduction compared to a baseline but did not differ from one another. Lights in general led to lower driving speed, potentially due to their warning character, but we found no difference between the light conditions, suggesting that the effect might not be based on the optic flow. Future research should investigate the relationship between driven and perceived speed more closely.

**Keywords:** Traffic Psychology, Nudging, Speed Perception, Traffic Safety, Driving Simulator, Field Test

**Presentation type:** Poster Presentation

---

## **Do Listeners Adjust Their Gaze Based on Context? Insights from a Dual Mobile Eye-Tracking Study**

Eva Landmann \*, Sabrina Gado , Anne Böckler

*Julius-Maximilians-Universität Würzburg*

Previous research demonstrates that when individuals observe conversations, their evaluation of what constitutes appropriate and empathetic gaze behavior for the listener varies with emotional context. For instance, stable direct gaze is preferred for neutral discussions, while occasional downward gaze shifts are seen as more adequate during emotionally negative topics. However, it remains unclear whether listeners naturally adopt these 'optimal' context-dependent gaze patterns when they are active interaction partners rather than external observers. In our study, we used a dual mobile eye-tracking setup to examine spontaneous gaze behavior during dyadic conversations. Participant pairs alternated between recounting short biographical episodes of varying emotional valence (neutral, negative, positive, embarrassing) and listening to their partner. Eye-tracking data were analyzed to assess context-dependent differences in the proportion of time spent fixating on the interaction partner's face and gaze shifts away from the face. While replicating general expected patterns, such as more direct gaze during listening than during talking, gaze behavior remained largely stable across emotional contexts, with consistently high levels of listener direct gaze regardless of topic. We discuss this overall stability, smaller context-specific variations, as well as potential reasons for the discrepancies compared to previous paradigms where participants rated interactions as observers.

**Keywords:** social cognition, social interaction, social gaze, eye-tracking, emotional context, gaze behavior, dyadic interaction

**Presentation type:** Poster Presentation

---

## Temporal preparation modulates speeded spatial selection in a flanker compatibility task

Robert Langner <sup>1, 2\*</sup>, Verena Seibold <sup>3</sup>, Bettina Rolke <sup>3</sup>

<sup>1</sup> *Institute of Systems Neuroscience, Heinrich Heine University Düsseldorf, Germany*, <sup>2</sup> *Brain and Behaviour, Institute of Neuroscience and Medicine (INM-7), Research Centre Jülich, Germany*, <sup>3</sup> *Evolutionary Cognition, Department of Psychology, University of Tübingen, Germany*

The allocation of attention to a given moment in time has been shown to confer benefits for perceiving and rapidly responding to isolated stimuli. Here we examined whether temporal preparation (TP) also improves the spatial selection of a stimulus and its associated response among competing alternatives. In a series of 3 experiments, we combined a flanker compatibility task, in which a central target letter was flanked by various (compatible, neutral or incompatible) lateral distractor letters to manipulate selection difficulty, with the constant-foreperiod paradigm, to manipulate TP. We found a reduced flanker compatibility effect with high (vs. low) degrees of TP. This boost of space-based target selection argues for synergies between TP and spatial attention. However, when response conflict was enhanced by having the flanking distractors precede target onset by 32 ms, the effect of TP was reversed, suggesting that a high degree of TP can also increase response selection difficulty, possibly by enhancing general response readiness. Taken together, TP appears to modulate speeded spatial selection in conflict situations, producing net performance benefits or costs depending on the relative strength of stimulus- vs. response-related types of conflict.

**Keywords:** attention, interference, conflict resolution, cognitive control

**Presentation type:** Poster Presentation

## **On the neural dynamics of cognitive control: asymmetric neural correlates when switching between affective expression and gender classification of perceived faces**

Leif Erik Langsdorf \*, Sebastian Kübler , Maryam Sadeghi , Torsten Schubert

*Martin-Luther University Halle-Wittenberg*

Task-switching paradigms are widely used to study cognitive control. Typically, switch costs (SC) emerge, reflecting performance costs in switch compared to repetition trials. Previous research reported asymmetrical SC (ASC), with larger SC for affective compared to neutral task-sets. This asymmetry likely reflects the dominance of the affective task-set, requiring inhibition to perform the neutral task-set, thus increasing SC for the affective task-set. While transient control processes have been studied, the neural correlates of ASC remain unclear. Additionally, it is unknown how neutral-affective task-set pairings influence sustained control processes, as reflected by the mixing costs (MC), the performance differences between repetition- and single-task trials, and their neural correlates.

To address these gaps, participants completed a cued task-switching paradigm during electroencephalographic recording, judging either the gender (neutral-task) or emotional expression (affective-task) of faces.

Behaviorally, ASC were obtained, with larger SC for the affective compared to neutral task-set, consistent with increased affective dominance. In contrast, MC were unaffected by task-set pairing. Neurally, during the cue-stimulus interval, the parietal switch positivity (SP) was reduced for affective compared to neutral task-sets, coinciding with increased SC which suggests an impaired task-set reconfiguration. However, the mixing positivity (MP) remained unchanged by the task-set pairing.

These findings indicate that neutral-affective task-set pairings selectively modulate transient neural correlates of cognitive control, as reflected by the reduced SP for the affective task-set, while sustained processes, as reflected by MP, remained unaffected. This study provides novel insights into how neutral-affective task-set pairings modulate transient but not sustained control processes.

**Keywords:** Cognitive Control Switch Positivity

**Presentation type:** Poster Presentation



## **Achievement Emotions in Visual Working Memory Paradigms: Findings from the Change Detection Task**

Sara Laybourn \*, Miriam Wunsch , Ananya Mandal , Anne C. Frenzel

*Ludwig-Maximilians-Universität Munich*

Laybourn et al. (2021) found that when measuring visual working memory (VWM) using the continuous color-report task (CCRT), emotions occur incidentally, i.e., the task itself triggers positive (joy, pride) and negative achievement emotions (frustration, boredom) in participants. The aim of the present study was to explore whether these findings can be generalized to other VWM paradigms, such as the change detection task (CDT). Here participants have to indicate whether a visual display showing colored items has changed. During the CCRT, participants need to recall the exact color of a specific item from a visual display by selecting it from a continuous color wheel. Compared to the CDT, the CCRT may feel more cognitively demanding, potentially eliciting a stronger emotional response from participants due to the increased effort required for precise recall. Thirty-eight (29 female;  $M_{age} = 23.6$ ,  $SD = 7.04$ ) participants performed the CDT containing 240 trials, divided into eight blocks of 30 trials alternating between four or eight colored squares. After each block, participants rated their task-related emotions (joy, pride, anger, frustration, boredom) on a 5-point-Likert scale. Multilevel modelling revealed that joy and pride were significantly positively and anger and frustration were significantly negatively linked with performance. These findings confirm that the achievement emotion-performance links found in Laybourn et al. (2021) can be generalized to other VWM paradigms and further highlights the need for research to consider the role of task-related emotions when measuring cognitive performance across different cognitive tasks.

**Keywords:** Visual Working Memory, Continuous Color-Report Task, Change-Detection Task, Task-Related Emotions, Achievement Emotions

**Presentation type:** Poster Presentation

## **Individual biases in memory modification**

Nina Liedtke <sup>\*</sup>, Marius Boeltzig, Ricarda I. Schubotz

*University of Münster*

A growing body of research suggests that episodic memories are not only used to remember the past, but also to make predictions about the future. When a prediction is incorrect, a prediction error (PE) arises, which can promote encoding. Previous studies have usually established artificial episodic memories and then evoked PEs by introducing unexpected changes to the stimuli. However, this does not sufficiently take into account that individuals differ in prior knowledge, previous experiences and beliefs, which should inform the initial prediction model employed when facing a novel stimulus. We therefore tested whether initial PEs at first encoding of new material can predict memory stability even in the face of future modifications.

To this end, participants encoded naturalistic dialogues while undergoing fMRI scanning and then rated the dialogues regarding five parameters thought to influence the initial PE: autobiographical association, social consistency, everyday typicality, arousal and valence. Later, some of the dialogues were modified to varying degrees. After that, the original dialogues were played again to establish their stability after having been modified. Consistent with previous research, a post-fMRI recognition test revealed that episodes that had higher arousal during encoding were remembered better, regardless of the strength of the modification. Representational similarity analysis in the bilateral hippocampus showed that representations of episodes changed more after modification when participants had a vivid autobiographical association and especially if the episode was negative. These results show that individual, initial PEs influence memory representations and outcomes after memory modification, even when controlling for PE strength.

**Keywords:** episodic memory, memory stability, individual biases, fMRI

**Presentation type:** Poster Presentation

## **Systematic Search: A new paradigm to measure the speed at which visual stimuli are processed**

Heinrich Liesefeld \*, Talke Michaelsen , Markus Janczyk

*University of Bremen*

The time it takes to process a visual stimulus is of importance in many areas of experimental psychology and beyond. One popular measure of stimulus-processing speed is derived from a manipulation of the number of stimuli (set size) in a visual-search task. This measure is the slope of the linear function relating the time needed to find a single target stimulus to set size (search slope). Compared to other approaches for measuring stimulus-processing speed, this has the advantage of isolating stimulus processing and relegating all extraneous processes (e.g., related to response selection) to the intercept of the linear function. Unfortunately, this “traditional” search slope is confounded in multiple ways and, consequently, is not actually suited to quantify stimulus-processing speed. Consequently, we have developed an alternative approach to measuring search slopes. Our new Systematic-Search paradigm reliably induces a specific search order, so that search slopes can be derived from the effect of target position rather than set size. We have validated this approach by showing that the position slope is affected by visual complexity, but not by the difficulty of response selection.

**Keywords:** Attention, visual search, vision, object processing, visual cognition

**Presentation type:** Poster Presentation

## **How vergence perception changes with distance**

Linda Linke \*, Gernot Horstmann

*Bielefeld University*

The perception of direct gaze give insights about the attention and interest of a looker. Besides the accurate perception of horizontal and vertical gaze direction, the perception of the depth of fixation is crucial to identify the looked-on object or person. Previous studies found evidence for a depth dimension of the area of direct gaze. The present study aims to identify the influence of observer-looker distance on the accepted range of convergence and divergence. The results of two experiments indicate a strong preference for parallel eyes as the perceived central depth for all distances (15 to 150 cm). Additionally, Experiment 1 provides evidence for the proximal border

being closer to the looker in near distances (13° vs. 11° vergence) which reflects an overall gain in size of the proximal area for larger distances. The border minimally shifts in direction to or from the looker in dependence on the observer's position. Overall, convergence angle corresponding to fixation distances up to of 10 to 20 cm in front of the looker are accepted by the observer relatively independent of his own position. Experiment 2 additionally, shows a rejection of the natural required vergence of 11.71° in 15 cm distance with the proximal border being less converged than necessary (10°). The distal border in both experiments was again large (10° divergence) indicating an infinite distal border. Following it is discussed if the depth dimension results in a spherical cone with its origin 10 to 20 cm in front of the looker.

**Keywords:** gaze perception, direct gaze, gaze cone

**Presentation type:** Poster Presentation

---

## Action resets the oscillatory pattern of auditory attention

Jianliang Luo <sup>1\*</sup>, Liyu Cao <sup>1, 2</sup>

<sup>1</sup> *Department of Psychology and Behavioural Sciences, Zhejiang University, Hangzhou, China,* <sup>2</sup>  
*The State Key Lab of Brain-Machine Intelligence, Zhejiang University, Hangzhou, China*

Recent progress in attention research suggests that the deployment of auditory attention resources is not stable, but oscillates at around 8 Hz in time. The present study investigated the deployment of auditory attention resources around a keypress. In experiment 1, a threshold-titrated tone was presented binaurally around the time of a voluntary keypress from the participants. Through the technique of behavioural dense sampling, we found that the tone detection rate oscillated at around 7 Hz following the keypress, but not before the keypress. In experiment 2, we asked participants to pay attention to one ear and ignore the other ear. However, threshold-titrated monaural tones could be presented to both ears for detection after a voluntary keypress. Results showed that the detection rate oscillated at around 7 Hz for the unattended ear but not the attended ear. Our results indicate that auditory attention oscillates at around 7 Hz. However, the oscillatory pattern in auditory attention may only be observed when the overall level of attention resources is not very high.

**Keywords:** auditory attention, oscillatory pattern, keypress

**Presentation type:** Poster Presentation

## **The influence of scripts on predictive action planning in 6 years old children**

Anjuscha Lütthgen \*, Gudrun Schwarzer , Bianca Jovanovic

*Justus Liebig Universität Gießen, Department of Entwicklungspsychologie, FB06*

Contextual knowledge (scripts) about familiar situations make adults' action planning faster and more efficient. To date, there is a lack of studies investigating the influence of contextual knowledge on kinematic measures related to children's action planning. Accordingly, we examined 20 6-year-olds using a 3-D motion capture system in an object transport task under varying instructions specifying contextual information to different degrees. Thus, children had either to simply transfer objects from one table to another table (no script information), to "set the table" (script information) or to arrange objects in a line (complexity control). In addition, we used two different stimulus sets, one semantically related (e.g., fork, cup) and the other semantically unrelated (e.g., toothbrush, hairbrush) to table setting, with two identical shared objects, namely a bowl and a spoon. We assumed that the table-setting instruction and the semantically related set would facilitate action planning, and would result in an earlier maximum hand speed and lower number of movement units during the reaching phase for the bowl and the spoon. As predicted, children produced fewer movement units with the semantically related set than with the unrelated set. In the table-setting task the maximum hand speed was reached significantly earlier than under the other instruction conditions. The results confirm our assumption that both the contextual knowledge and information conveyed by the stimulus set can facilitate action planning. Context thus appears to influence action planning in 6-year-olds.

**Keywords:** contextual knowledge, scripts, predictive action planning, grasping, reaching

**Presentation type:** Poster Presentation

## An Electrophysiological Study To Investigate Human Defense Responses In Virtual Reality

Vidisha Maithani <sup>1\*</sup>, Kapil Faujdar <sup>3</sup>, Manish Kumar Asthana <sup>1, 2</sup>

<sup>1</sup> *Department of Humanities & Social Sciences, Indian Institute of Technology Roorkee, India,* <sup>2</sup> *Department of Design, Indian Institute of Technology Roorkee, India,* <sup>3</sup> *Department of Cognitive and Brain Sciences, Indian Institute of Technology Gandhinagar, India*

Fear is an integral part of an organism's defense mechanism to avert predators and increase prey's probability of survival. A predatory imminence continuum displays psychological perception of threat's imminence to visualise risk for the prey (Fanselow & Lester, 1988). The study investigates Fight/Flight defense responses and underlying neural correlates using EEG. Twenty-nine participants (Mean(SD)=22.21(3.76)) underwent training and experimental phases in a desktop-VR environment. Conditions 1 to 4, except 5, included a threat avatar. The conditions differed based on threat proximity (distal/proximal) and participant's escapability (escape/no-escape). Twenty-trials were presented, with each condition presented 4 times. Participants responded with Fight/Flight response to threat, followed by rest-scene (10s) and fixation (5s). A chi-square test indicated no significant difference between fight/flight responses across 4 conditions. A paired t-test indicated significant differences between Fight(M=2.52,SD=1.30) and Flight(M=1.41,SD=1.30),  $t(28)=2.30, p=0.03$  in 'Distal threat escape', Fight(M=2.55,SD=1.40) and Flight (M=1.31,SD=1.31),  $t(28)=2.48, p=0.02$  in 'Distal threat no-escape', Fight (M=2.55,SD=1.21) and Flight (M=1.31,SD=1.20),  $t(28) = 2.80, p = 0.01$  in 'Proximal threat escape', and Fight (M=2.76,SD=1.38) and Flight (M = 1.17, SD = 1.37),  $t(28) = 3.13, p < 0.01$  in 'Proximal threat no-escape' conditions. A rmANOVA for reaction-time indicated significant difference across 4 conditions,  $F(3,84) = 5.30, p < 0.01, \eta^2 = 0.16$ . Time-frequency analysis showed peaks in delta-power in proximal threat conditions. A heightened Fight behavioural response was observed across all conditions, as in VR, participants' actions did not involve consequences compared to real-life. A significant difference in reaction-time indicates distinction based on threat proximity and escapability. The delta-power may indicate involvement of emotional (threat) and cognitive (Fight/Flight) components and neural distinction for threat and no-threat conditions. The findings will help understand defense responses to design interventions for anxiety disorders in VR environment.

**Keywords:** Predatory imminence continuum, fight, flight, threat proximity

**Presentation type:** Poster Presentation

## **Art for Attendees' Sake: The Beneficial Effects of Arts Attendance on Subjective Well-Being in People High in Neuroticism**

Maria Manolika <sup>\*</sup>, Thomas Jacobsen

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

Neuroticism has long been known as a risk factor not only for diminished happiness, but also for impaired health. And yet, despite growing evidence for the beneficial effects of arts attendance on health and happiness, the question still remains: Do people high in neuroticism benefit from arts attendance? Using data from a nationally representative panel study from Germany (N = 874), in the present study we examined the hypothesis that arts attendance moderates the effects of neuroticism on subjective well-being components—life satisfaction, positive affect, and negative affect. Moderation analyses, as expected, suggested arts attendance as a buffer against the adverse effects of neuroticism on life satisfaction and positive affect as well. Arts attendance, however, did not moderate the relation of neuroticism to negative affect, which further confirms the core feature of neuroticism: the propensity towards negative emotional states. Overall, however, our findings strengthen the evidence for the potential of art as a source of happiness and illustrate the importance of its promotion among people scoring high in neuroticism.

**Keywords:** Neuroticism, well-being, arts attendance

**Presentation type:** Poster Presentation

---

## **How does the fridge's bzzz influence your search for milk? The effect of anchor object sound on visual search**

Yuri Markov <sup>1\*</sup>, Ayman Al-Zoubi <sup>1</sup>, Melissa Lê-Hoa Võ <sup>1, 2</sup>

<sup>1</sup> *Goethe University Frankfurt, Department of Psychology, Scene Grammar Lab, Germany*, <sup>2</sup> *Neuro-Cognitive Psychology, Department of Psychology, LMU Munich*

We search for items in complex environments daily. Previous studies have shown that search behavior in real-world scenes follows scene grammar rules—statistical patterns learned from the typical placement of objects in a scene (Võ, 2019). For example, a sponge is often found near a sink. These large, stationary objects referred to as anchors in the scene grammar framework tend to predict the identity and location of smaller objects. However, our environment consists not only of

visual information but also auditory information. A previous study found no effect of the sound of the target on visual search in real-world scenes (Seidel et al., 2018). In our study, we aimed to investigate whether the sound of anchor objects could help locate target objects. We presented the sound of anchor objects for 5 seconds, which could be either consistent (sound from an anchor object present in the scene) or inconsistent (sound from anchor objects absent from the scene). After the sound, a preview of the scene was presented for 1 second, followed by the target name for another 1.5 seconds. Then, the scene with a target was shown, but only a small area around the mouse cursor was visible. Participants were instructed to move the mouse to find the target and click on it. We found that RTs for correct answers were faster in the consistent compared to the inconsistent condition. We propose that the sound of anchor objects helps participants navigate complex, realistic environments, making it easier to locate the target.

**Keywords:** visual search, scene grammar, multisensory integration

**Presentation type:** Poster Presentation

---

## Error processing mechanisms in evaluative concerns perfectionists: Effects of feedback presentation

André Mattes \*, Jutta Stahl

*University of Cologne*

A key dimension of perfectionism is evaluative concerns perfectionism (ECP), i.e. the tendency to strive for flawlessness out of fear of being judged negatively by others if performance is flawed. Previous studies have shown that despite their preoccupation with errors, high-EC perfectionists show less error-specific neural activity. Two accounts have been proposed to explain this finding. The avoidance account posits a motivational lack of error processing and postulates that high-EC perfectionists avoid processing their errors in an attempt to avoid the negative consequences associated with errors. The capacity account posits a structural lack of error processing, claiming that high-EC perfectionists spend many of their cognitive resources on error-related content, such as worrying about errors, leaving fewer resources for error processing. Distinguishing between these accounts is challenging, as they predict similar outcomes. To address this, we developed an experimental design that allowed us to disentangle the two accounts. Participants completed an Eriksen flanker task. In one part of the experiment, they received no feedback on their performance. In the other part of the experiment, participants were continuously confronted with their current performance throughout the entire experimental block. The avoidance hypothesis predicts



increased error processing in the feedback condition for high-EC perfectionists, as avoiding error processing is no longer advantageous. Conversely, the capacity hypothesis predicts unaffected or reduced error processing due to increased allocation of cognitive resources to performance feedback. We will present initial results from this ongoing study to elucidate the underlying mechanisms of impaired error processing in high-EC perfectionists.

**Keywords:** error processing, cognitive control, perfectionism, error-related negativity, drift diffusion model, computational modelling, cognitive neuroscience

**Presentation type:** Poster Presentation

---

## **Spoiler alert: Outflanking distractors in the Flanker task**

Daniel Maurer <sup>1, 2\*</sup>, Christian Frings <sup>1, 2</sup>

<sup>1</sup> *Department of Cognitive Psychology, Trier University, Trier, Germany*, <sup>2</sup> *Institute for Cognitive & Affective Neuroscience (ICAN), Trier University, Trier, Germany*

The ability to adapt behavior based on environmental demands is a cornerstone of human cognition. This study investigates the role of foreknowledge—completely reliable pre-cued information about upcoming trial attributes—in aiding action selection. Specifically, it explores how distractor-related foreknowledge, either at the stimulus or response level, influences cognitive performance in conflict scenarios. Prior research predominantly focuses on stimulus-level foreknowledge, examining how it affects auditory and visual tasks. However, the impacts of response-level foreknowledge remain less understood. Our research utilized the Flanker task, a paradigm where a target stimulus is flanked by adjacent stimuli that could be perceptually congruent or incongruent and may require the same or different responses. We manipulated foreknowledge about the identity and response characteristics of distractors. The experiments employed a two-factorial mixed design with foreknowledge (control, identity, response) as a between-subjects factor and compatibility (incompatible, compatible, identical) as a within-subjects factor. Foreknowledge cues were provided before each trial, indicating either the shape or the mapped response of the upcoming distractors. Results from two experiments indicated that both stimulus-level and response-level foreknowledge effectively reduced response interference, aligning with the common coding theory's suggestion of an integral link between stimulus and response representations. Perceptual interference only increased when foreknowledge was provided at the stimulus level.

**Keywords:** cognitive control, foreknowledge, common coding, flanker task, distractor cueing, inhibition, processing stage

**Presentation type:** Poster Presentation

---

## Can memorizing reduce the decay of event files?

Susanne Mayr \*, Anna Render , Malte Möller

*University of Passau*

Features of stimuli and responses are assumed to be temporarily integrated into so-called event files that can be retrieved upon repetition of any of their features and, consequently, influence behavior. Event files seem to decay within a few seconds, based on the finding that their behavioral after-effects are weaker after long as compared with short intervals between event file formation and retrieval.

In the presented experiment (N = 223), participants were either instructed to memorize the stimulus identity (memorizing group) or not (control group) of the S1 in an S1R1–S2R2 task. Event file binding was measured by means of partial-repetition costs (in response times and errors); event file decay was analyzed by comparing partial-repetition costs between trials with short (500 ms) and long (5,000 ms) R1-S2 intervals. To manipulate maintenance of S1 stimulus information, participants in the memorizing group had to answer a forced-choice task concerning S1 stimulus identity after R2 responding. There was no such task in the control group.

Partial repetition costs were generally smaller after long as compared with short R1-S2 intervals. When S1 stimulus information had to be memorized, partial repetition costs were present in both intervals. However, without an instruction to memorize, partial repetition costs in error rates occurred in short intervals only.

In sum, there is some evidence that memorizing of features included in an event file mitigates the decay of this event file. Consequences for the interplay among event file binding and retrieval, attention, and working memory are discussed.

**Keywords:** event file, binding, retrieval, memory, decay

**Presentation type:** Poster Presentation

---

## **Everyone (else) is a bigot: A metacognitive account of pluralistic ignorance and how to correct it**

Cristina Mendonça <sup>1\*</sup>, André Mata <sup>2</sup>, Sofia Narciso <sup>2</sup>, Rosário Ferreira <sup>2</sup>

<sup>1</sup> *LIP - Laboratório de Instrumentação e Física Experimental de Partículas*, <sup>2</sup> *Faculdade de Psicologia Universidade de Lisboa*

Most people think most others are more biased than they themselves are. This distorted view is worrisome because how we act is often determined by what we think most others do and/or approve of. In two studies, we first show a pluralistic ignorance of prejudice by measuring participants' explicit and implicit attitudes and asking them about other people's attitudes. According to our expectations, most participants thought others are more prejudiced than they themselves are, which appears to result from the fact that they project their own implicit attitudes on others' attitudes, while then distancing themselves from their own automatic reactions. In the second study, we show that providing feedback reduces this pluralistic ignorance, finding some evidence that people begin to use their explicit (and less prejudiced) answers to predict what others may believe. Together, these studies reveal the importance of communicating clear and reliable information about what most people think and suggest the dangers of being exposed to biased information environments, such as digital echo chambers.

**Keywords:** social psychology, prejudice, pluralistic ignorance, metacognition

**Presentation type:** Poster Presentation

---

## **No error on the side of safety: looming stimuli do not elicit representational momentum**

Simon Merz <sup>1, 2\*</sup>, Christian Frings <sup>1, 2</sup>, Charles Spence <sup>3</sup>, Hauke Meyerhoff <sup>4</sup>

<sup>1</sup> *Department of General Psychology, Trier University*, <sup>2</sup> *Institute for Cognitive and Affective Neuroscience, Trier University*, <sup>3</sup> *Department of Experimental Psychology, University of Oxford, UK*,  
<sup>4</sup> *University of Erfurt*

The looming bias describes systematic differences in the perception of looming, approaching stimuli compared to receding stimuli. To date, the most prominent and successful theory to account for this bias is the adaptive bias theory, based on the larger error management theory framework, which argues for a perceptual bias for looming stimuli to err on the side of safety. We challenge this notion

by providing evidence using the established probe comparison task of the representational momentum literature which indicates no systematic shift in motion direction for perceived final intensity of looming, approaching stimuli. Across two auditory experiments using either classical sine wave (Experiment 1) or more complex tones (Experiment 2), we replicated findings of no perceived shift in motion direction for approaching stimuli, even when accounting for general, change independent localization biases. We provide an alternative framework, the speed prior account of motion perception, to explain the present, as well as further, currently unexplained findings in the literature.

**Keywords:** Looming bias, Adaptive Bias, Representational momentum, Motion perception, Speed Prior Account

**Presentation type:** Poster Presentation

---

## Memory for Sharing True vs. Fake News on Social Media

Luise Metzger <sup>1\*</sup>, Kamaljit Bajwa <sup>2</sup>, Jaskirat Bajwa <sup>3</sup>, Gordon Pennycook <sup>4</sup>, Daniel Bernstein <sup>3</sup>, Edgar Erdfelder <sup>1</sup>

<sup>1</sup> *University of Mannheim*, <sup>2</sup> *University of Victoria*, <sup>3</sup> *Kwantlen Polytechnic University*, <sup>4</sup> *Cornell University*

In an online experiment (N = 339), we explored sharing of news headlines on social media. Unbeknownst to participants, half the headlines were real news and the other half fake news. Participants first chose which headlines to share. After a 10-minute retention interval, participants completed an unexpected headline source monitoring test. Participants provided old-new recognition judgments and indicated their remembered behavior (i.e., shared vs. not shared) for each recognized headline. Multinomial processing tree (MPT) analyses revealed little impact of headline truth value on memory parameters. True headlines were shared more often than fake headlines. While recognition memory was better for shared headlines, sharing memory was better for not shared headlines. Hierarchical MPT analyses additionally explored correlations between model parameters and the impact of individual differences in cognitive reflection and open-minded thinking on model parameters. In line with previous findings, results suggest a “social media sharing mindset” characterized by less analytic processing.

**Keywords:** source monitoring, memory, misinformation, social media sharing

**Presentation type:** Poster Presentation

## **Distractor-Induced Deafness for Short and Long Tones**

Lars Michael \*, Paula Schubert , Greta Josephin Krems

*Medical School Berlin*

In studies on the distractor-induced blindness/deafness paradigm, an inhibitory process of selective attention was observed when distractors exhibited characteristics similar to those of the subsequent target, resulting in a reduced detection rate. While previous studies have focused on frequency differences for auditory stimuli, the present study considers the effects of duration differences. In two blocks, participants were required to detect either relatively short tones with a duration of 50 ms embedded within a context of longer tones with a duration of 100 ms, or relatively long tones with a duration of 100 ms embedded within a context of shorter tones with a duration of 50 ms, when presented with a visual cue. Tones of the same duration as the target stimulus served as distractors. The number of distractors varied between six, three, and zero across trials. The results demonstrate that the detection rate declines significantly as the number of distractors increases, with a more pronounced effect observed for short tones. Surprisingly, the observed phenomenon is contingent on the sequence of test conditions. Specifically, a more pronounced reduction in the detection rate for short tones occurs when long tones were to be detected first, whereas the detection of long tones is enhanced when short tones were to be observed first.

**Keywords:** Consciousness, Selective Attention, Auditory Perception

**Presentation type:** Poster Presentation

---

## **Do Emotions Come in a Package? Exploring Emotional Response Coherence using a Psychometric Network Approach**

Ji-Young Min \*, Miriam Wünsch , Franziska Eckerskorn , Anne C. Frenzel

*LMU Munich*

Emotions come in various ways, such as subjective feelings, physiological responses, and facial expressions. Whether these components exhibit synchronised coordination during emotional episodes—referred to as emotional response coherence—has been central to a century-long debate about the nature of emotions and their underlying mechanisms. Despite agreement that emotions involve multiple interconnected components, hardly any studies have adopted a structural perspective to capture these interrelationships. This study examined coherence between subjective

emotional experiences and physiological arousal, measured via skin conductance (SC), within an achievement context using a psychometric network approach. A total of 159 participants completed a numeric reasoning test, in which the item difficulty levels were manipulated to induce varying emotional responses. During the test, self-reports of discrete emotions (joy, pride, anger, anxiety, frustration, and boredom), valence, and arousal were collected alongside continuously recorded SC signals. Multi-level graphical vector auto-regressive (GVAR) models were employed to analyse multi-componential relationships at the intra-individual level. Findings revealed a multifaceted relationship between emotional experience and physiology, rather than a straightforward one-to-one correspondence. Significant associations were found between valence and SC measures, particularly SC response peak frequency and tonic level, while subjective arousal showed no significant links to SC measures. These results suggest that emotional response patterns may not be uniquely tied to specific emotions and may vary depending on context and measurement methods. As one of the first studies to examine emotional response coherence using a network approach, this research offers novel insights that may help reconcile long-standing theoretical divergences in emotion research.

**Keywords:** emotional response coherence, subjective emotional experience, physiological arousal, skin conductance, network psychometrics

**Presentation type:** Poster Presentation

---

## Electrophysiological Analysis of Outcome Evaluation Following Free-Choice and Forced-Choice Tasks

Victor Mittelstädt \*, Ian Grant Mackenzie , Klara Greisiger , Hartmut Leuthold

*University of Tübingen*

Several studies suggest that increased volitional control through choosing freely between options, rather than not being able to choose (forced-choice), can lead to differences in motivational, affective, and cognitive processing (e.g., sense of agency). These differences may, in turn, influence how we evaluate the outcomes associated with these options. However, it remains unclear how having control over choosing between different tasks that require more effortful processing when switching, as opposed to repeating, affects outcome evaluation. In the present electrophysiological study, participants freely chose between two tasks or were forced to perform one, and received performance-independent feedback (reward or loss) after correct performance. Preliminary results from two experiments show larger feedback-locked FCz and P3 amplitudes,

along with increased midfrontal theta power, for feedback following more effortful task switches compared to task repetitions, and for free-choice compared to forced-choice tasks. Moreover, the increased neural outcome processing when switching tasks was more pronounced for free-choice than forced-choice tasks. Overall, these findings suggest that outcomes following freely chosen tasks are more strongly valued, with this value inflation being particularly pronounced when the task requires greater effort (i.e., during task switches).

**Presentation type:** Poster Presentation

---

## There is no phonological awareness in speech perception

Holger Mitterer \*

*University of Malta, Hanyang University*

Phonological awareness, the ability to appreciate spoken language as a sequence of phonemes, arises only by learning to read (Morais et al., 1979, *Cognition*, 7, 323–33). Following this finding, it has been claimed that learning to read influences pre-lexical units used for speech perception (Pattamadilok et al., 2014, *Brain Lang*, 137, 103–111), and that those units then support phonological awareness (Morais, 2021, *Cognition*, 213, 104740). Given that these units are pre-lexical and activated by input, this leads to the prediction that having a grapheme for a speech sound leads to a pre-lexical unit that is available for conscious inspection. We tested this prediction by asking Maltese and German listeners to describe the differences between two utterances that differed by the presence or absence of a glottal stop, which has a graphemic representation in both languages (\*, the gender star, in German, and the letter <q> in Maltese). Both languages, however, also use the glottal stop for prosodic means, in which case it is not orthographically coded. We presented listeners with spoken utterances differing by the presence of a glottal stop that was coded orthographically or not (e.g., in German; not coded, *gegenarbeiten* vs. *gegen Arbeiten*, Engl. ‘work against’ vs. ‘against working’; coded: *Spioninnen* vs. *Spion\*Innen* Engl. ‘females spies’ vs. ‘mixed-gender group of spies’). In contrast with the above prediction, listeners were overwhelmingly unable to identify a glottal stop that was not orthographically coded. This indicates that phonological awareness is not based on units used in speech perception.

**Keywords:** phonological awareness, reading acquisition, speech perception

**Presentation type:** Poster Presentation

## **Experimentally Manipulating Mediating Processes in Group Decision-Making Research**

Andreas Mojzisch <sup>1\*</sup>, Jan Häusser <sup>2</sup>

<sup>1</sup> *University of Hildesheim*, <sup>2</sup> *University of Gießen*

Understanding the mechanisms underlying group decision-making is a cornerstone of social psychology. In order to shed light on these mechanisms, group researchers typically conduct mediation analyses. In my talk, I will argue that almost all previous studies in group research fail to establish causality when conducting mediation analyses. This is because they typically rely on measurement-of-mediation designs which means that they measure the proposed mediating variable. This is ironic because, after all, talking about mediation is assuming causality. Thus, it is assumed that the independent variable causes a change in the mediator that causes a change in the dependent variable. However, we cannot test for causality if we only measure the mediating variable. While not being a panacea, one way to address this issue is to conduct manipulation-of-mediator designs. In my talk, I will give several examples on how to conduct manipulation-of-mediator designs in group decision-making research.

**Presentation type:** Poster Presentation

---

## **Attention towards task-irrelevant emotional stimuli during a short mental time-traveling intervention**

Olaf Morgenroth <sup>\*</sup>, Julia Reichensperger, Ella Tambwé, Mike Wendt, Ulrike Zimmer

*Medical School Hamburg*

There are two contradictory hypotheses considering how affective states modulate attention to upcoming emotional stimuli: Affective priming vs. counter-regulation. Mental time travel enables adopting a distanced perspective on negative emotional experiences as a cognitive emotion regulation strategy. We applied a symmetry judgment task with a concurrent but task-irrelevant emotional distractor to investigate whether a short mental time-traveling intervention modulates attention towards emotional information. Participants were instructed to judge the symmetry or asymmetry of three-letter strings. Each trial presented a task-irrelevant smiley or frowny (positive vs. negative emotional content) above the judgment task. After induction of anger by autobiographical recall, we instructed participants either to immerse themselves in the event or imagine it from a



distant future (mental time traveling). Mental time-traveling but not adopting a self-immersed perspective reduced state anger ( $d = -1.37$  vs.  $d = -0.05$ ). In the mental time-traveling condition, reaction times in the judgment task were longer with a frowny distractor compared to a smiley and vice versa for the self-immersed perspective ( $F_{(1/23)} = 8.92$ ;  $p = .007$ , partial  $\eta^2 = .279$ ). Results are consistent with a counter-regulation interpretation. Further studies are needed to replicate the effect and to investigate whether it is a consequence of the reduced anger or directly stems from the intervention.

**Keywords:** attention, emotion regulation, counter-regulation, mental time travel, anger, smiley

**Presentation type:** Poster Presentation

---

## The effect of stimulus frequency and range on category differentiation

Barbara Mühlbauer \*, Felix Wichmann  
*University of Tübingen, Tübingen, Germany*

Levari et al. (2018) found that participants shift their perceived category of the color "blue" when the frequency of "blue" stimuli they were presented with changed. However, they neither took individual differences in color categories into account, nor did they relate their findings to existing theories of perceptual category shifting.

We performed several experiments to understand whether and how an individual's category boundary shifts as a result of previously seen stimuli, and whether the shifts are also present in a similarity rating task. Additionally, different models were evaluated by comparing how well they predict data and how systematic their errors are. All stimuli were carefully selected and confounders closely monitored.

In two experiments we replicated that changing the frequency of "blue" stimuli shifts color categorization. Time-course and effect size can be predicted using both the Range-Frequency (Parducci, 1965) and the Criterion Setting Theory Model (Treisman & Williams, 1984). In a similarity rating task without category judgments we used a triplet embedding method in two conditions: One had an equal number of stimuli from both categories, while the other had 90% from one category. By comparing the distances in the aligned embeddings, we can show that the perceived similarity also changes based on stimulus context.

Levari, D.E., Gilbert, D.T., Wilson, T.D., Sievers, B., Amodio, D.M., Wheatley, T. (2018). Prevalence-induced concept change in human judgment. *Science*, 360(6396), 1465–1467.

Parducci, A. (1965). Category judgment: a range-frequency model. *Psychological review*, 72(6), 407.

Treisman, M., Williams, T.C.(1984). A theory of criterion setting with an application to sequential dependencies. *Psychological review*,91(1),68.

**Keywords:** categorization, category perception, color perception, decision criterion setting, decisionriterion modeling

**Presentation type:** Poster Presentation

---

## Can visual decisions be manipulated by explainable artificial intelligence?

Romy Müller <sup>1\*</sup>, Carsten Knoll <sup>2</sup>

<sup>1</sup> *Technische Universität Dresden, Chair of Engineering Psychology and Applied Cognitive Research*, <sup>2</sup> *Technische Universität Dresden, Chair of Fundamentals of Electrical Engineering*

While explainable artificial intelligence (XAI) promises to make AI more transparent, explanations can induce overtrust. This has usually been investigated in tasks where decisions could either be right or wrong. Conversely, many real-life decisions depend on subjective criteria. For instance, does a suboptimal food item look like it is still edible? The present study investigated whether visual decision criteria are susceptible to manipulation via XAI. In a simulated quality control task, participants saw images of faulty chocolate bars. They decided whether the chocolate should be retained or discarded, and rated the severity of the fault. In half of the trials, they received XAI support in the form of heatmaps overlaid on the images. This XAI highlighted the areas that led an AI algorithm to judge the chocolate as faulty. We hypothesised that such XAI would lead participants to discard more chocolate, but that this would also depend on the visual features of the fault. The results revealed no overall effects of XAI, but clear image-specific effects. When faults were large and non-salient, participants discarded more chocolate with XAI than without. When faults were smaller but more salient, the opposite was found. Importantly, these XAI-induced biases were only observed when participants fully relied on the XAI without inspecting the original image. Taken together, the results suggest that XAI can indeed manipulate decision criteria, but only under particular conditions and only if people do not cross-check its results.

**Keywords:** explainable artificial intelligence, overtrust, decision criteria, visual decision making

**Presentation type:** Poster Presentation

## **From tusk till horn: Modulating feature boundaries in action control**

Nicolas Münster \*, Christian Frings

*University of Trier*

Stimulus features that occur in action episodes are integrated with response features into event files, and event files are retrieved when features are repeated. However, the strength of retrieval depends on the extent to which a particular feature is actually repeated. Since not only perceptual but also conceptual features are assumed to be bound, the boundaries between feature representations may not only be fluid but also modifiable. In three experiments (cumulative  $n = 217$ ), we investigated whether internal manipulation of feature boundaries is possible. By adding additional counting tasks to a stimulus-response binding task, we either merged or separated feature categories, causing a significant difference in S-R binding effects: Merged feature categories produced weaker S-R binding effects compared to separated feature categories. The results suggest that merged features were actively made to be processed as more similar to each other. We interpret our data within the broader and old question of what a feature actually is, and suggest that feature boundaries are task-dependent.

**Keywords:** S-R binding, Stimulus feature, Action Control

**Presentation type:** Poster Presentation

---

## **Flashlight visual search impairs speed but not accuracy or memory in the real world**

Sarah Jasmin Nachtnebel \*, Alejandro Javier Cambrónero Delgadillo , Christof Körner , Margit

Höfler

*University of Graz*

Previous research in visual search has mostly focused on controlled, screen-based settings. Scenarios, such as searching in real-world dark spaces, remain less explored. Here, we investigated the effect of three lighting conditions - illuminated (room fully lit), floodlight (room dark, search with flashlight with broad lighting beam), and spotlight (room dark, search with flashlight with narrow lighting beam) - on visual search accuracy, response times, and subsequent memory for objects in a real-world office environment. In each of the three lighting conditions, 36 participants

subsequently searched for 60 everyday target objects (half present, half absent) amongst 30 distractors. Manual responses regarding target presence/absence were indicated via a bluetooth device. After the end of the search blocks, participants completed a recognition test to assess target memory (object had to be searched) and visual memory (object was seen). Results revealed that search accuracy was higher for absent targets than for present targets, regardless of lighting condition. However, response times differed significantly: searches were fastest in the illuminated condition, slower in the floodlight condition, and slowest in the spotlight condition. Target memory was most accurate for distractors, lower for present targets, and lowest for absent targets, with no significant influence of lighting. Visual memory showed the opposite pattern: distractors were remembered worse than both present and absent targets, with no difference between the latter. To conclude, lighting conditions did not affect memory performance and search accuracy, suggesting that peripheral vision constraints in flashlight searches impair search time but do not compromise memory encoding.

**Keywords:** visual search, real-world, memory, flashlight

**Presentation type:** Poster Presentation

---

## Divided we stand: A tutorial on using variability in theory and data analysis

Christoph Naefgen <sup>1\*</sup>, Daniel Gotthardt <sup>2</sup>, Anne Reinarz <sup>3</sup>

<sup>1</sup> FernUniversität in Hagen, <sup>2</sup> Universität Hamburg, <sup>3</sup> Durham University

This poster presents some tools for utilizing variability in research.

In both society and academic research, there is an increasing emphasis on acknowledging psychological divergences from averages. Yet, techniques required to analyze variability as a subject of interest rather than a nuisance are seldom taught in study programs. Consequently, interested researchers may benefit from support when asking themselves one or more of these questions:

(1) How can I enrich my theories with variability on the conceptual level? (2) How can I use variability to test theories that I otherwise could not distinguish from each other (as with some competing theories of dual-task performance)? (3) How do I test variability hypotheses, especially in the face of measurement error?

To help with this, we created a tutorial and are developing online resources/references.

Drawing from computational cognition research, we propose a theory-oriented workflow that enriches research in experimental/cognitive psychology research with a variability perspective. We take you through five steps from developing a formal theoretical model, to deriving predictions and testing those predictions. Each step's implementation is illustrated with a fictional researcher's journey.

Alongside exemplary theoretical mechanisms, we explain how variance function and quantile regression can be used to test hypotheses about variability. The workflow is extensible and easily adapted to specific research contexts. This poster provides an overview over this workflow and its components, providing interested researchers with several potential entry points to this wide class of approaches and perspectives.

**Keywords:** variability, conditional dispersion, cognitive modeling, tutorial, meta-theory

**Presentation type:** Poster Presentation

---

## **A Systematic Investigation of Integrated Speed-Accuracy Measures in Within-Subject Designs.**

Thomas Narraway \*, Heinrich R. Liesefeld , Markus Janczyk  
*University of Bremen*

Speed and accuracy are often mutually exclusive; participants can either respond quickly and make mistakes, or they can take more time to accumulate evidence and thus respond accurately. This trade between speed and accuracy is called the Speed-Accuracy Tradeoff (SAT). Whether such SATs result from changes in attention or motivation during the experiment, or from how different participants understand the instructions of a task; their occurrence complicates interpretation of experimental effects. This raises the question: is it possible to integrate speed and accuracy, thereby creating an easier-to-understand metric? Liesefeld and Janczyk (2019, Behavior Research Methods) examined several possible ways of integrating speed and accuracy in between-subject designs using the inverse efficiency score, linear integrated speed-accuracy score, and balanced integration score. Further, Liesefeld and Janczyk (2023, Behavior Research Methods) briefly touched upon the issue of within-subject designs. The current project extends this work by (1) systematically exploring a larger range of parameters in the simulation of within-subjects designs, and (2) introducing further combined measures into the analyses, such as reward rate, Log A index, and the signed residual time.

**Keywords:** Speed-Accuracy Tradeoff, Simulation, Integrated Measures, Response Times.

**Presentation type:** Poster Presentation

---

## The fundamental frequencies of our own voice

Hakam Neamaalkassis <sup>1, 2, 3\*</sup>, Yves Boubenec <sup>2</sup>, Christian Fiebach <sup>3</sup>, R. Muralikrishnan <sup>1</sup>, Alessandro Tavano <sup>1, 3</sup>

<sup>1</sup> *Department of Cognitive Psychology, Max Planck Institute for Empirical Aesthetics, Grüneburgweg 14, 63122 Frankfurt a. M., Germany,* <sup>2</sup> *Département d'Études Cognitives, École Normale Supérieure, PSL Research University, CNRS, 29 rue d'Ulm, 75005 Paris, France,* <sup>3</sup> *Department of Psychology, Goethe University Frankfurt, Theodor-W.-Adorno-Platz 1, 60323 Frankfurt a. M., Germany*

Own actions send a corollary discharge (CD) signal, that is a copy of the planned motor program, to sensory-specific brain areas to suppress the anticipated sensory response (Crapse & Sommer, 2008), providing a neural basis for the sense of self. When we speak, the sensory consequences of the fundamental frequency ( $f_0$ ) of our own voice, generated by vocal fold vibrations, are suppressed. However, due to bone/air conduction filtering effects, the  $f_0$  we self-generate is measurably different from the  $f_0$  we subjectively perceive as defining our own voice (Kimura & Yotsumoto, 2018). We hypothesised that there exists also a frequency-specific decrease in frequency change resolution while listening, as a byproduct of recurrent, long-term neural suppression in response to self-generated speech. Using pure tones in an auditory change deafness paradigm, we parametrically tested the sensitivity to auditory change in the frequency neighbourhoods of objective and subjective own voice pitches, relative to a control pitch condition. Behavioural results and a mixed-effects model of the data revealed that participants experience change deafness for both subjective and objective pitches to a similar extent, indicating a significantly lower frequency change resolution compared to the control pitch condition. We conclude that also when we listen attentively, we are likely to filter out small pitch changes in the vicinity of our own objective and subjective voice  $f_0$ , thus preferentially gating in voices that are different from ours.

**Keywords:** Change deafness, auditory attention, attentive filters, corollary discharge, subjective perception, self-generation

**Presentation type:** Poster Presentation

## **Crossing Boundaries: Event Boundaries disrupt Binding of Response Representations in First Person Perspective**

Maria Nemeth \*, Christian Frings , Birte Moeller

*Trier University*

To make sense of the continuous stream of perception in everyday life, the cognitive system organizes it into discrete, meaningful units called events. This structure of event perception has been shown to be highly critical as it influences important mechanisms like memory within and across events. One important dimension for segmenting sensory experience into events is the presence of spatial boundaries, such as walking through a doorway between two rooms (i.e., the location updating effect; Radvansky & Copeland, 2006). A previous study suggests that the perception of event boundaries also influences important action control mechanisms, with both binding and retrieval of actions being disrupted by boundary perception (Moeller et al., in press). Here, we investigated whether the same disruption in the binding of response representations occurs in a first-person perspective scenario involving perceptually similar events separated by a door as a boundary. In the present study (N = 76), we found that responses bound within an event produced stronger binding effects compared to responses that had to be bound across an event boundary. Our results replicate Moeller et al. (in press), demonstrating that event structure perception influences ongoing action control, and extend these findings to first-person perspective scenarios involving perceptually similar events.

### **References:**

- Moeller, B., Beste, C., Münchau, A., & Frings, C. (in press). Large scale event segmentation affects the micro-level action control processes. *Journal of Experimental Psychology: General*.
- Radvansky, G. A., & Copeland, D. E. (2006). Walking through doorways causes forgetting: Situation models and experienced space. *Memory & cognition*, 34, 1150-1156.

**Keywords:** Event segmentation, event boundaries, action control, event file, response-response binding

**Presentation type:** Poster Presentation

## Emotional and social features shape the representation of dynamic facial expressions

Hilal Nizamoglu <sup>1, 2\*</sup>, Fatma Celebi <sup>1</sup>, Katharina Dobs <sup>1, 2</sup>

<sup>1</sup> *Justus Liebig University in Giessen*, <sup>2</sup> *Center for Mind, Brain and Behavior*

Dynamic facial expressions play a crucial role in daily communication by revealing emotions, social cues, and mental states. While the dimensions of object and action representations are increasingly well-understood, how humans represent dynamic facial expressions remains unclear. Here, we investigated which dimensions shape the human representational space of dynamic facial expressions using emotional, social, and motion-based features. Participants (N=19) performed a multi-arrangement task on 48 facial expression videos (4 actors, 12 expressions: 6 emotional, 6 conversational). In addition, ratings on emotional dimensions (valence, arousal, affectiveness), social dimensions (communicativeness, potency), and motion features (e.g., head and facial part movements) were collected from a larger sample (N=37). To understand which feature dimensions underlie the representational space, we applied Representational Similarity Analysis (RSA) to the behavioral similarity judgments derived from the task. Additionally, we created model representational dissimilarity matrices to measure the influence of expression and identity on human perceptual judgments. Results revealed substantial discrepancy among participants' strategies on their similarity judgments, with some participants prioritizing expressions and others focusing on actor identity. Across participants, valence, potency, and communicativeness were found as the strongest predictors of representational similarities, while arousal, affectiveness and motion features had limited influence. These findings highlight the multidimensional nature of dynamic facial expression representations, emphasizing the critical role of emotional and social dimensions in shaping this representational space.

**Keywords:** Facial expression, similarity judgment, dynamic faces

**Presentation type:** Poster Presentation



## **Metacognition in the Face of Distraction**

Sandra Nowak <sup>\*</sup>, Katarzyna Zawadzka , Maciej Hanczakowski

*Adam Mickiewicz University*

Auditory distraction is known to negatively impact memory performance. To mitigate its negative effects, accurate metacognitive monitoring is necessary. Recent research shows that in a serial recall task people are able to accurately assess the negative impact of different kinds of auditory distraction on memory, correctly ranking them from the most to the least disruptive. But are those assessments general – people perceive different kinds of auditory distraction as more or less disruptive – or are they task specific, correctly reflecting that distraction affects memory performance differently depending on test type? To investigate this, we replaced the serial recall task with a missing item task that produces a different pattern of distraction-related impairment, and collected prospective and retrospective metacognitive judgments throughout the task. Our results replicate previous findings showing differences in distraction effects across tasks, and underscore the importance of assessing metacognitive monitoring as a function of the task it applies to.

**Keywords:** auditory distraction, metacognition, missing-item task

**Presentation type:** Poster Presentation

---

## **Eyes wide open: Object-scene congruency and the pupillary response**

Antje Nuthmann <sup>1\*</sup>, Annika Agrawal <sup>1, 2</sup>

<sup>1</sup> *Kiel University*, <sup>2</sup> *Washington University St. Louis*

The pupil response has long been considered a robust marker of cognitive load. In the context of semantic processing, research has demonstrated that the pupil dilates in response to stimuli which violate contextual expectations (e.g. events presented out of chronological order). However, the scope of this relationship has yet to be fully elucidated. For example, incongruent object-scene relationships, while comprehensively explored by eye-tracking and electrophysiology research, have yet to be investigated via pupillometry. In this study, we measured pupil size in response to an object-scene congruency task. Participants were presented with a photorealistic background scene and instructed to fixate their gaze on a cued point within the scene. Upon recovery of pupil size to baseline, a congruent object (i.e. an object which fit into the overall meaning of the scene) or an incongruent object appeared at the cued fixation point for the remainder of each trial. We

hypothesized that incongruent objects would result in greater mean pupil dilation from baseline than congruent objects, due to the increase in cognitive effort required for semantic processing of incongruent objects within a scene. Yet, in opposition to our hypothesis, the results of a time course analysis revealed that pupil size was significantly greater for the congruent condition than the incongruent condition. The resulting implications for understanding pupil dilation as a physiological marker for high-level cognitive processes such as semantic integration are discussed.

**Keywords:** pupillary response, semantic processing, object recognition, scene context, cognitive load

**Presentation type:** Poster Presentation

---

## Does Complex Working Memory Span Rely on Long-Term Memory?

Klaus Oberauer \*

*University of Zurich*

When we test a person's working memory (WM), the information to be maintained is also encoded into episodic long-term memory (LTM). People could draw on LTM to assist with the WM test. One difference between the two forms of memory is that WM protects its contents against proactive interference from outdated information whereas LTM is vulnerable to proactive interference. Therefore, we can use proactive interference as an empirical signature of contributions of LTM to performance in a WM test. Previous work has shown that LTM contributes little, if anything, to verbal simple span tasks (Oberauer & Bartsch, 2023, JoC). Here I investigate whether LTM contributes to performance in complex span tasks, when encoding of list items is interleaved with distractor processing. Several authors (e.g., Unsworth, McCabe) have argued that complex span relies in part on retrieval from LTM. Against that conjecture, I found no evidence for proactive interference in complex span. The complex-span paradigm is very similar to the Brown-Peterson paradigm, for which proactive interference is well documented. I will present experiments comparing proactive interference in comparable complex span and Brown-Peterson tasks, which differ only in the scheduling of the distractor processing (in between vs. after presentation of list items). Results will be revealed in the talk.

**Keywords:** working memory, long-term memory, proactive interference, complex span

**Presentation type:** Poster Presentation

## **Coping with Failures: The Role of Emotions, Individual Traits, and Expectation Characteristics**

Lara Orphal \*, Martin Pinquart

*1: Philipps-Universität Marburg, Psychological Faculty, AE Developmental Psychology*

**Background:** Individuals cope with expectation violations in three different ways: assimilation (increasing efforts for expectation maintenance), immunization (ignoring or downplaying discrepant information) and accommodation (changing the expectation). Which contextual and personality factors influence expectation maintenance and change is still subject to investigation.

**Objective:** This study aimed to determine how two academic emotions, confusion (an epistemic emotion) and annoyance (an achievement emotion), as well as Tolerance of Ambiguity (as personality factor), the importance of an expectation and the prior experiences regarding this expectation (situational factors), relate to coping with expectation violations in achievement contexts.

**Methods:** Vignettes describing achievement expectation violations were presented to an initial sample of 310 participants. The stories varied in importance of an achievement (high, low), prior experience (confirming, disconfirming, no prior experience), and emotional reaction to the achievement failure (confusion, annoyance, no emotional reaction). As outcome measures, participants indicated their subjective likelihood of using three different coping responses to the expectation violation: assimilation, immunization and accommodation. In addition, Tolerance of Ambiguity was assessed using the German version of the Tolerance of Ambiguity Scale.

**Results:** Overall, annoyance and confusion predicted higher assimilation and lower immunization. Higher Tolerance of Ambiguity predicted higher immunization and lower accommodation, while higher importance of an initially expected outcome resulted in higher assimilation and lower accommodation. Finally, prior expectation confirmation strengthened expectations, resulting in higher assimilation and immunization, and lower accommodation, while disconfirming prior experience was taken into account only for accommodation.

**Keywords:** emotions, tolerance of ambiguity, prior experience, importance, expectations, expectation violation, coping

**Presentation type:** Poster Presentation

## Turning heads: A field experiment on dynamic versus static eye-catchers in shop window decoration

Heike Kiesewetter <sup>1</sup>, Stefan Ortlieb <sup>1, 2\*</sup>, Mia Degro <sup>1</sup>, Claus-Christian Carbon <sup>1, 2</sup>, Marius Raab <sup>1, 2, 3</sup>

<sup>1</sup> *University of Bamberg*, <sup>2</sup> *Research Group for Ergonomics, Psychological Aesthetics and Gestalt (EPÆG), Bamberg, Germany*, <sup>3</sup> *Technische Hochschule Nürnberg Georg Simon Ohm, Nürnberg, Germany*

In a observational field experiment we explored the effects of dynamic versus static eye-catchers in shop windows on consumer behavior: Do more passers-by stop in front of a shop window when there is movement? Do they look at the display for longer? Does the type of movement (e.g. speed and constancy) make a difference?

To understand how aesthetic qualities of shop windows affect consumers' behavior, we conducted an observational field study with 289 individuals who were observed in front of a hat maker's shop window. The window display varied as follows: In the first experimental condition (fast & furious), a fan swirled star garlands hanging from the ceiling, while the hats remained motionless. In the second experimental condition (slow & steady), a platform was slowly rotating, showing the hats from all sides. In the control condition (static), both the rotating platform and the fan were switched off.

We observed that, compared to the static control condition, more passers-by stopped in front of the shop window whenever movement was present. However, there was a difference between the two experimental conditions: While the fast & furious condition attracted more passers-by, people in the slow & steady condition looked at the hats longer, possibly indicating a higher interest in the product. This interpretation is backed by the observation that average dwell time between the slow & steady and the control condition did not differ. Our findings raise new research questions regarding the use of dynamic elements in the design of salient shop windows.

**Keywords:** Keywords: empirical aesthetics, everyday aesthetics, eye-catcher, shop window decoration

**Presentation type:** Poster Presentation

## Exploring Performance and Trust in Teleoperation: The Role of Visuo-Haptic Guidance in Autonomous Systems

Frank Papenmeier <sup>1\*</sup>, Katharina Hagmann <sup>2</sup>, Lisa Blosssey <sup>1</sup>, Andreea E. Potinteu <sup>1,3</sup>, Adrian Bauer <sup>2</sup>,  
Bernhard Weber <sup>2</sup>, Julian Klodmann <sup>2</sup>, Daniel Leidner <sup>2</sup>, Markus Huff <sup>1,3</sup>

<sup>1</sup> *University of Tübingen, Germany*, <sup>2</sup> *German Aerospace Center (DLR), Weßling, Germany*, <sup>3</sup>  
*Leibniz-Institut für Wissensmedien, Tübingen, Germany*

Incorporating autonomy into teleoperation systems for minimally invasive robotic surgery requires operators to effectively manage transitions from full autonomy to semi-autonomous control during system failures. This experiment investigated the impact of visuo-haptic guidance compared to visual guidance on participants' performance during take-over situations and their trust in the teleoperation systems. Students, unfamiliar with the system and task, performed a ring transfer task under two conditions: visual guidance, where they monitored the system visually, and visuo-haptic guidance, where they also received haptic feedback by holding the input device as the system operated in full autonomy. During some trials, system failures occurred, requiring participants to take over control. Results showed that participants noticed system failures faster with visuo-haptic guidance compared to visual guidance. Although visuo-haptic guidance did not improve task completion times or accuracy during the transfer and placement phases, it led to significantly higher trust in the teleoperation system and a stronger sense of perceived control. However, participants also reported higher physical demand and effort under visuo-haptic guidance, indicating an increased workload in this condition. These findings reveal important trade-offs in integrating haptic feedback into teleoperated autonomous systems. While visuo-haptic guidance improved failure detection, trust, and perceived control, it also increased user workload. As this study was conducted with non-expert participants, further research is needed to explore how visuo-haptic guidance affects experienced users.

**Keywords:** teleoperation, visuo-haptic guidance, human-robot interaction, trust in automation, system failures

**Presentation type:** Poster Presentation

## **Amodal completion in transsaccadic object correspondence**

Fabian Parth <sup>1\*</sup>, Alexander C. Schütz <sup>1, 2</sup>

<sup>1</sup> AG Sensomotorisches Lernen, Fachbereich Psychologie, Philipps-Universität Marburg, Germany,

<sup>2</sup> Center for Mind, Brain and Behavior, Marburg & Gießen, Germany

Saccadic eye movements bring objects from the peripheral visual field to the fovea. To establish transsaccadic object correspondence (TOC), specific features - such as shape, texture, displacement, size, and contrast - are used to match pre- and postsaccadic information. However, the available object information can change when objects move during a saccade and become partially-occluded by other objects. This raises the question how the visual system deals with such changes and if perceptual completion can aid TOC. Here, we used a postsaccadic target selection task to understand the dynamics of TOC and to examine if observers are able to establish TOC to an object that is partially occluded and amodally completed. As soon as the observers initiated a horizontal saccade to the presaccadic peripheral object, it was replaced by two vertically displaced candidates. One candidate was either behind or in front of another object, such that it was either partially-occluded or fully-visible. The other candidate was either changed in shape or identical to the presaccadic object.

We found longer corrective saccade latencies when observers targeted the candidate that overlapped with the other object, indicating a cost for saccades to a more complex configuration. Corrective saccades showed faster latencies with amodal completion aiding detection of the partially-occluded target compared to its ambiguous counterpart, where completion was hindering for target selection. These findings indicate an involvement of higher visual areas for postsaccadic recognition of complex objects and suggest that amodal completion can be used to establish TOC.

**Keywords:** saccades, amodal completion, object correspondence, postsaccadic, occlusion

**Presentation type:** Poster Presentation

## **Reinterpreting Self- and We-Prioritization: How Polarity Correspondence can account for Prioritization Effects**

Marcel Pauly \*, Dirk Wentura

*Saarland University*

Self-prioritization effects (SPE; Sui et al., 2012) and related phenomena like we-prioritization effects (WPE; Constable et al., 2019) are generally discussed as being genuinely based on prioritized processing of self-related stimuli. Here, we assume that these types of prioritization effects can (at least partially) be explained by the Polarity Correspondence Principle (PCP, Proctor & Cho, 2006). This principle states that in binary classification tasks participants arrange the stimulus and response alternatives on plus and minus poles, respectively. Responses are faster if stimulus and response poles correspond. Applied to the SPE, in self-related matching trials all plus polarities meet (i.e., self-label, self-shape, yes response). To test this assumption, participants learned to associate geometric shapes with a self-relevant and one other-relevant label (Experiment 1) or two different other-relevant labels (i.e., the more common version of the paradigm; Experiment 2). In a between-design, participants were instructed to affirm either “mono-combinations” (label-shape combinations where label and shape refer to the same person) or “duo-combinations” (label-shape combinations where the label refers to one and the shape to another person). Thus, according to the polarity rationale, matching self-related trials are still “+++” in the “mono” condition, but “++–” in the “duo” condition. In the “mono”-block we found a clear SPE in both experiments. In the “duo” block, however, the SPE disappeared (Experiment 1) or was significantly reduced (Experiment 2). We applied the same logic to WPEs and found similar results. These results suggest that a substantial part of prioritization processes can be explained by the PCP.

**Keywords:** Self-prioritization effect, We-prioritization effect, Polarity Correspondence Principle, self-relevance

**Presentation type:** Poster Presentation

## Differential Processing of Familiar and Unfamiliar Faces and Objects in Hybrid Foraging Tasks

Carmen Peiro-Lanchares <sup>1\*</sup>, Sandra Doval <sup>2</sup>, Beatriz Gil-Gómez de Liaño <sup>1</sup>

<sup>1</sup> *Department of Social Psychology and Methodology, Universidad Autónoma de Madrid, Spain,* <sup>2</sup> *Department of Experimental Psychology, Cognitive Processes and Speech Therapy, Universidad Complutense de Madrid (UCM), 28223, Madrid, Spain.*

Hybrid foraging is a type of visual search where individuals look for multiple instances of several target types among distractors, like looking for different colored shapes when playing with construction toys. These tasks offer rich cognitive information including attentional and memory processes, executive functions, or stimulus processing, among others. Behavioral and neuroimaging studies suggest differences in how faces and objects are processed. Moreover, evidence indicates that familiar faces are processed more automatically than unfamiliar ones. While previous research has examined face and object processing separately, their differential processing in complex search scenarios remains unexplored. In this study, we used a motion hybrid foraging task adapted from Gil-Gómez de Liaño & Wolfe (2022) to investigate differential stimulus processing using familiar and unfamiliar faces. Thirty-two participants completed three conditions with different stimulus: objects (stuffed animals), familiar-famous faces and unfamiliar faces. Participants had to select multiple instances of five target types among distractors. Results revealed a clear performance hierarchy: stuffed animals showed superior performance, followed by famous faces, with unfamiliar faces showing the poorest performance. Analysis of search patterns (runs-switches among target types; thus, consecutive target selections or alternations among targets) suggested that target-distractor similarity may play a crucial role in these performance differences, extending our understanding of how stimulus familiarity may modulate visual search strategies in complex scenarios. Future research combining ERP measurements while controlling for perceptual similarity across conditions will help disentangle the contribution of familiarity from low-level visual differences in complex foraging tasks.

**Keywords:** Hybrid Foraging, Visual Search, Object processing, Face processing, Familiarity

**Presentation type:** Poster Presentation



## Is a distrust instruction helpful when interacting with a fallible AI?

Tobias Peters \*, Ingrid Scharlau

*Paderborn University*

One use case of Artificial Intelligence (AI) is to support humans in their decision-making, for example in the context of medical image classification. Often a combination of an expert's knowledgeable perception and an AI-generated classification as advice are required. Another requirement is that the AI's suggestions are explainable in order to ensure humans' understanding and to foster their trust. Given that AI models can err, we argue that the possibility to critically review, thus to distrust, an AI decision and its explanation is an equally interesting target of research.

We studied task performance, trust, and distrust in an image classification experiment in which the participants were supported by a mock-up AI. The quality of the AI's classifications decreased for a phase of the experiments. We tested whether the instruction to remain sceptical and to critically review the AI advice leads to a better decision performance, compared to a control condition with neutral instructions. To improve generalisability, we ran two parallel studies, using one set of stimuli, which participants encounter regularly, and one set of abstract stimuli that the participants needed to be familiarized with.

A Bayesian Signal Detection Theory analysis shows the expected difference in the participants' performance for the abstract stimulus set, but not for the familiar stimuli, where a tendency in the opposite direction is observed. Repeated single-item self-report of trust and distrust shows an increase in trust and a decrease in distrust after the drop of the AI's classification quality, with no difference between conditions.

**Keywords:** Human-AI interaction, Distrust, Image Classification, Signal Detection Theory, Appropriate Trust, Explainable AI

**Presentation type:** Poster Presentation

## **Visual working memory-related saccades biases depend on task demands**

Patrik Polgári \*, Alexander C. Schütz

*Sensorimotor Learning unit Department of Psychology University of Marburg*

Visual working memory (VWM) is directionally linked to oculomotor control. Hollingworth & Luck (2009) showed that corrective saccades can be biased towards distractors whose feature matches the content of VWM. Here, we investigated whether this effect is modulated by task demands. 20 participants had to memorize a color hue and then to discriminate it from another hue from a different (Easy condition) or the same color category (Difficult condition). In between encoding and test, they performed a gaze-contingent saccade task. During the saccade to the target, the position of items shifted and the color of a neighboring distractor changed to a color (dis)similar to the memorized one.

VWM performance was higher in the Easy compared to the Difficult condition, showing successful manipulation of task demands. Replicating previous findings, corrective saccades were biased more towards the distractor when it matched VWM content than when it did not. Importantly, saccade biases towards the distractor occurred more frequently in the Difficult compared to the Easy condition, indicating the influence of task demands on oculomotor biases. Moreover, in the Easy condition, saccade biases to distractors matching VWM content were related with better VWM performance.

Our results indicate that the likelihood of saccade biases is related to the task difficulty and VWM engagement.

**Keywords:** visual working memory, eye movements, eye tracking, oculomotor capture

**Presentation type:** Poster Presentation

## **Assessing underlying processes of implicit weight bias: A diffusion model analysis**

Katja Pollak <sup>\*</sup>, Hanna Wachten , Raphael Hartmann , Constantin Meyer-Grant , Julius Fenn , Jana Strahler , Andrea Kiesel  
*University of Freiburg*

Weight bias, the negative attitude toward overweight and/or obese individuals, has become a pressing concern amid the global rise in overweight and obesity prevalence, highlighting the need to understand the mechanisms underlying this bias. In the present study, we therefore employed an affective priming paradigm to assess the underlying processes of implicit weight bias. Participants ( $N = 164$ ) completed an online experiment in which primes depicting four gender-matched body types (underweight, normal weight, overweight, and muscular) were presented, followed by target stimuli (positive and negative adjectives) that participants had to classify as either positive or negative. We analyzed the reaction time distributions for both correct and incorrect responses using a Bayesian hierarchical implementation of the diffusion model, which allowed us to disentangle distinct cognitive processes, such as decision thresholds, processing speeds, and a priori biases. Preliminary results of these analyses indicate that exposure to the overweight prime was associated with a higher decision threshold compared to the underweight prime. This suggests participants exhibited greater caution or deliberation after seeing an overweight prime compared to an underweight prime, which could potentially reflect an internal conflict or hesitation. Our findings shed light on the implicit mechanisms of weight bias, particularly how certain body types subconsciously influence decision-making processes. Our findings thereby offer a new basis for the development of future interventions aiming at reducing implicit weight biases.

**Keywords:** diffusion modeling, implicit bias, weight bias, affective priming

**Presentation type:** Poster Presentation

## Enhanced Effects in the Affective Spatial Compatibility Task Despite Low Stimulus Valence

Kristin Prehn <sup>1, 2\*</sup>, Mike Wendt <sup>1, 2</sup>

<sup>1</sup> *Department of Psychology, Medical School Hamburg*, <sup>2</sup> *ICAN Institute for Cognitive and Affective Neuroscience, Medical School Hamburg*

In spatial compatibility tasks, performance is better when participants respond to stimuli presented on the right side by pressing the right key than by pressing the left key, and vice versa for left-sided stimuli. This phenomenon is referred to as the spatial stimulus-response compatibility (SRC) effect. When valence judgment tasks are used, in which participants respond to positive stimuli in a spatially compatible manner and to negative stimuli in an incompatible manner, or with the mappings switched (Affective Spatial Compatibility Task), a different pattern of results emerges. Specifically, performance is better with a positive-compatible and negative-incompatible stimulus-response mapping than vice versa, resulting in a reversed SRC effect for negative stimuli. This valence-by-mapping (VM) interaction has been attributed to approach/avoidance tendencies or differences in the ease of task-set selection (i.e., the specific stimulus-response mapping). In the present study, we expanded on these findings by comparing the effect induced by flower and spider images from previous studies with those of novel stimulus sets and judgment tasks: symmetric vs. asymmetric letter strings in Experiment 1, and congruent vs. incongruent Stroop stimuli in Experiment 2. We found a more pronounced VM interaction for both letter-string and Stroop stimuli, despite their relatively low valence ratings. Taken together, our results challenge the approach/avoidance account and instead suggest more general semantic comparison processes underlying the VM interaction.

**Keywords:** Spatial Stimulus-Response Compatibility (SRC) Effect, Affective Valence, Congruency, Stroop Stimuli, Symmetry

**Presentation type:** Poster Presentation

## People are sensitive to their uniquely patterned retinal input

Amit Rawal <sup>1, 2\*</sup>, Rosanne L. Rademaker <sup>1</sup>

<sup>1</sup> *Ernst Strüngmann Institute (ESI) for Neuroscience in Cooperation with Max Planck Society, Frankfurt, Germany,* <sup>2</sup> *Faculty of Behavioural and Human Movement Sciences, Vrije Universiteit Amsterdam, The Netherlands*

Visual exploration through eye movements involves frequent changes to the visual input on our retinæ. This visual input is patterned by factors such as where we look, how often we move our eyes, and our behavioural goals. Previous research has shown consistencies in saccade behaviour within individuals over a variety of images and tasks, resulting in uniquely patterned visual input for different people. Are people sensitive to their own pattern of visual input, and can they distinguish it from the input of others? To test this, we recorded subjects' eye position during free-viewing of natural scene stimuli. From these gaze trajectories, we cropped 7° radius images around individuals' eye positions, to create a sequence of images for later replay at fixation. Each subject viewed 100 replays created from their own eye data, and 100 from other subjects' data. Nearly all subjects performed above-chance at choosing whether a replay was theirs or not, with higher confidence on correct than incorrect trials. Subjects responded fastest when reporting a replay was theirs (even when it wasn't), and were relatively quicker on correct trials. Interestingly, pupil size reflected ground truth, with larger dilations as subjects viewed other subjects' replays, irrespective of their subsequent choice and its accuracy. Additionally, when a subject mistook another subject's replay as theirs, the scanpath constituting that replay tended to be more similar to their own scanpath on that image during free-viewing. In summary, we find that people are sensitive to visual inputs patterned by their own unique eye movements.

**Keywords:** Eye movements, individual differences, meta-cognition, free-viewing

**Presentation type:** Poster Presentation

## **Auditory and visual hysteresis: common and modality-specific neural mechanisms**

Tim Redepenning <sup>1\*</sup>, Miguel Porta-García <sup>2</sup>, Christoph Schütz <sup>1, 3</sup>

<sup>1</sup> *Bielefeld University, Faculty of Psychology and Sports Science*, <sup>2</sup> *Centro de Investigación e Innovación en Tecnologías de la Información y Comunicación (INFOTEC), Consejo Nacional de Humanidades, Ciencias y Tecnologías (CONAHCYT)*, <sup>3</sup> *Bielefeld University, CITEC, Center for Cognitive Interaction Technology*

Bistable stimuli have often been used to study how our brain creates a stable perception or detects changes in the surrounding world. When the immediate perceptual past causes us to persist in a former percept and thus helps to stabilize our perception, this is termed hysteresis. We investigated the neural correlates underlying auditory and visual hysteresis. To this end, we recorded EEG data while presenting participants with ambiguous Necker cubes (Experiment 1) and Shepard tones (Experiment 2) in gradually shifted sequences to evoke a hysteresis effect. The behavioural data showed this effect for both modalities ( $p < .05$ ). The subsequent ITC analysis revealed significant differences between the perception of stimuli in sequential order (hysteresis condition) and in random order. While we found modality-exclusive differences, the most prominent commonality between the visual and auditory modalities was the more coherent activation of an area including dorsolateral parts of precentral, juxtapositional, and prefrontal cortices in the hysteresis condition. These areas have not only been linked to bistability but also have specifically been connected with working memory and attention – two processes that could be crucial for hysteresis. Interestingly, we also found a more coherent activation at electrodes over the lateral occipital complex (LOC) during the hysteresis condition across both modalities. The LOC has been hypothesized to play a stabilizing role during visual bistability. Its involvement in auditory bistable perception has not been reported yet. We propose that hysteresis is evoked through a complex interplay of networks that have been associated with working memory and attention.

**Keywords:** brain, perceptual hysteresis, ambiguous stimuli, multistability, bistability, EEG, neural response

**Presentation type:** Poster Presentation

## Reactive and proactive control when switching between first-person and third-person perspectives

Julia Reichensperger <sup>1, 2\*</sup>, Olaf Morgenroth <sup>1, 2</sup>, Mike Wendt <sup>1, 2</sup>

<sup>1</sup> *Department of Psychology, Medical School Hamburg*, <sup>2</sup> *ICAN Institute for Cognitive and Affective Neuroscience, Medical School Hamburg*

Spatial judgments made from a third-person perspective (3PP) are assumed to suffer interference from the first-person perspective (1PP). A component of this interference likely results from spatial stimulus-response correspondence as target stimulus features likely activate spatially corresponding response codes via a “direct” or “unconditional” processing route. Previous findings of particular impairment when switching from 3PP to 1PP judgment have been taken to reflect (reactive) inhibitory control (i.e., aftermath of suppression of 1PP processing when making a 3PP judgment). To investigate both reactive and proactive control in 3PP processing, we applied a perspective switching protocol which, on each trial, required a 3PP judgment (a.k.a. own body transformation task) or a 1PP judgment. The relevant perspective was indicated by a cue presented 1000 ms in advance of the target stimulus. In a proportion of trials, however, a Simon task was presented instead of the 1PP or 3PP judgment task indicated by the cue. To assess reactive control, we compared the performance cost of switching between perspectives. Consistent with the inhibitory control account the switch cost was larger for 1PP than for 3PP judgments. By contrast, performance in the Simon task was not worse after 3PP trials than after 1PP trials, dismissing a sequential difficulty interpretation of the switch cost asymmetry. Moreover, preliminary evidence for proactive control (i.e., suppression of the direct route during preparation of 3PP processing) was obtained in the form of a trend reflecting a larger Simon effect after 1PP cueing than after 3PP cueing.

**Keywords:** perspective taking, cognitive control, switch cost, spatial compatibility

**Presentation type:** Poster Presentation

## **An Updated Short Form of the Everyday Problems Test: Validity, Reliability, and Relations to Cognitive Performance**

Alice Reinhartz <sup>1, 2\*</sup>, Sylvie Belleville <sup>3, 4</sup>, Thomas Jacobsen <sup>2</sup>, Tilo Strobach <sup>1</sup>, Claudia C. von Bastian

5

*<sup>1</sup> Department of Psychology, Medical School Hamburg, Hamburg, Germany, <sup>2</sup> Experimental Psychology Unit, Helmut Schmidt University/University of the Federal Armed Forces Hamburg, Hamburg, Germany, <sup>3</sup> Université de Montréal, Montréal, Canada, <sup>4</sup> Institut Universitaire de Gériatrie de Montréal, Montréal, Canada, <sup>5</sup> Department of Psychology, University of Sheffield, Sheffield, UK*

Navigating and solving problems in everyday life is crucial to living independently throughout adulthood. Using real-life scenarios, the Everyday Problems Test (EPT; Willis & Marsiske, 1993) is a pen-and-paper test used to assess such everyday problem solving. This test was developed according to the seven scales of the Instrumental Activities of Daily Living (IADL; Lawton & Brody, 1969) and validated in a sample of only older adults. However, not all items of the original EPT are up-to-date and applicable outside the US. Therefore, we developed and validated a new online short form of the EPT that can be used in different countries and assessed its validity across the full adult lifespan. We constructed an English, French, and German EPT version with each 14 items to be implemented within a multi-site cognitive training study taking place in three countries: the UK, Canada, and Germany (von Bastian et al., 2022). Within this multi-site study, participants (N = 424; M age = 48.2; range age = 18-85) were asked to complete the 14-item EPT in their respective language along with various other cognitive tasks. Overall, the new short form of the EPT is sensitive to effects of age and education. Performance on this test of everyday problem solving relates strongly to participants' abilities to solve other reasoning tasks. The relationship between problem solving in an everyday context and the performance in cognitive domains such as working memory, inhibition, and processing speed will be further analyzed and discussed.

**Keywords:** Everyday Problem Solving, Adult Lifespan, Education, Reasoning, Working Memory, Inhibition, Processing Speed

**Presentation type:** Poster Presentation



## The Role of Emotional Facial Expressions and Evolutionarily Relevant Source Information in Recognition and Source Memory

Sezer Rengiiyiler <sup>1, 2\*</sup>, Aycan Kapucu <sup>2</sup>, Başak Acar <sup>3</sup>

<sup>1</sup> *Department of Psychology, Sinop University, Sinop, Turkey,* <sup>2</sup> *Department of Psychology, Ege University, Izmir, Turkey,* <sup>3</sup> *Department of Psychology, Kadir Has University, Istanbul, Turkey*

While most research investigating the influence of emotional facial expressions on cognitive processes adopts a dimensional approach, emerging evidence suggests that expressions conveying discrete emotions alter information processing based on their distinct communicative signal values (e.g., Whalen, 1998). Notably, previous work has demonstrated that fearful faces not only diffuse attention to contextual information but also enhance memory, while angry faces elicit higher recognition accuracy by focusing attentional resources on themselves (Davis et al., 2011; Taylor & Whalen, 2014). However, it remains unclear whether facial stimuli with divergent communicative values modulate source monitoring and source memory processes. Accordingly, this study examined whether fearful and angry faces, differing in two evolutionarily relevant source information qualities—group membership (in-group vs. out-group) and sex (Becker et al., 2010)—differentially affect recognition and source memory performance. Following an incidental encoding task, participants' old/new recognition and source decisions were collected in a sequential source-monitoring test. Although the results demonstrated a recognition memory advantage for angry faces, this was attributed to response bias rather than recognition sensitivity. Thus, both angry and fearful faces induced a more liberal bias than neutral faces. Furthermore, irrespective of the response bias, recognition accuracy was higher for female faces than male faces. Finally, source memory performance for in-group faces exceeded that for out-group faces, regardless of emotional expression and sex. These findings underscore the necessity of considering additional emotional expressions with distinct ecological signal values and evolutionarily significant source information (e.g., kinship) when investigating the interplay between recognition and source memory.

**Keywords:** emotional faces, facial expressions, recognition memory, source memory, threat

**Presentation type:** Poster Presentation

## The Role of Working Memory on Aesthetic Judgments

Jana Engel , Bettina Rolke \*

*University of Tübingen*

The results of studies that have examined the influence of working memory load on aesthetic judgments are contradictory. While some studies have shown that memory load has no effect on aesthetic judgments (Bara et al., 2023), others have shown that high memory load can reduce beauty ratings (Briellmann & Pelli, 2017). In two experiments, we investigated how different types of memory load affect aesthetic evaluations of neutral object images. In Experiment 1, participants rehearsed visual and auditory memory items and rated the aesthetic appearance of images of chairs. Results showed that chairs received lower ratings in the more difficult auditory memory condition than in the easier visual load task. Experiment 2 used only visual memory items and showed that chairs received lower ratings under high memory load compared to a low load condition. Taken together, our results suggest that increased cognitive processing demands induced by rehearsing memory items negatively affect aesthetic judgments of object pictures. The type of memory task (e.g., different domains, different levels of load) appears to modulate its impact on aesthetic judgment, potentially explaining the inconsistencies observed in previous findings.

### References:

- Bara, I., Binney, R.J., & Ramsey, R. (2023). Investigating the role of working memory resources across aesthetic and nonaesthetic judgments. *Quarterly Journal of Experimental Psychology*, 76, 1026-1044.
- Briellmann, A. A. & Pelli, D. G. (2017). Beauty Requires Thought. *Current Biology* 27, 1506-1513.

**Keywords:** empirical aesthetics, working memory load, aesthetic judgment, cognitive capacity

**Presentation type:** Poster Presentation

## Multimodal Machine Learning for Diagnosis and Severity Prediction in Bulimic-Type Eating Disorders

Lena Rommerskirchen <sup>1\*</sup>, Mandy Skunde <sup>1</sup>, Martin Bendszus <sup>2</sup>, Hans-Christoph Friederich <sup>1,3</sup>, Joe J. Simon <sup>1,3</sup>

<sup>1</sup> Department of General Internal Medicine and Psychosomatics, University Hospital Heidelberg, Germany, <sup>2</sup> Department of Neuroradiology, University Hospital Heidelberg, Germany, <sup>3</sup> DZPG (German Centre for Mental Health) – Partner Site Heidelberg/Mannheim/Ulm, Germany

Bulimic-type eating disorders, like bulimia nervosa (BN) and binge eating disorder (BED), are characterized by a wide range of neurocognitive alterations. Neuroimaging studies have highlighted impairments in brain networks associated with self-control functions, including inhibition, reward processing, and homeostasis. However, case-control analyses that focus on a limited set of these domains frequently produce inconsistent results. Given the complex behavioral patterns characteristic for these disorders, particularly regarding eating behaviors, these findings suggest substantial variability and interaction at the neurobiological level, which likely underpins the heterogeneous nature of these disorders. This study explores the utility of a data-driven machine-learning approach to predict diagnosis and disease severity in subjects with either BN, BED or healthy controls at the individual level. We included 30 patients with BN and 30 patients with BED from a previously published dataset. To better capture complex network features and their interactions, and to extend traditional univariate analyses, we trained multiple predictive models using a combination of neuroimaging data (structural, resting-state, and task-based), behavioral performance measures, blood parameters, and psychometric questionnaires. Models are fitted with a 5-fold nested cross-validation procedure and integrated feature selection and hyperparameter tuning. We hypothesize that the multimodal integration of diverse feature types will improve discriminative accuracy when distinguishing between patients and controls, compared to models based on a single modality. Additionally, we expect that the contribution of individual features will differ depending on whether the model is predicting disease severity or diagnosis. The results of this study will be presented at the conference.

**Keywords:** Machine-Learning, fmri, eating-disorders, inhibition, reward

**Presentation type:** Poster Presentation

## **The influence of non-invasive prefrontal brain stimulation on intertemporal decision-making**

Marcus Rothkirch \*, Anna-Maria Macha , Anne Weigand

*Department of Psychology, Medical School Berlin*

Intertemporal decision-making requires weighing choice options that differ in timing and magnitude. In this context, individual preferences for immediate rewards despite lower payoffs are often interpreted as indicators of impulsive decision-making. While the dorsolateral prefrontal cortex (DLPFC) is known to play a role in decision-making, its specific function in intertemporal choices remains elusive. In our study, we investigated whether non-invasive stimulation of the left DLPFC reduces impulsive decisions. To this end, participants completed two sessions of a delay discounting task, in which they had to choose between fictitious smaller immediate and larger future rewards. In one session, anodal transcranial direct current stimulation (tDCS) was applied over their left DLPFC, while in the other session they received a sham stimulation. We fitted hyperbolic functions to each participant's choice behaviour to quantify the individual degree of impulsive decision-making. Contrary to our hypothesis, stimulation of the left DLPFC did not reduce discounting of future rewards and thus not decrease impulsive decisions. However, tDCS-induced changes in affect were correlated with discounting rates, such that reductions in negative affect and increases in positive affect elicited by tDCS were associated with a decrease in impulsive choices under tDCS. Our findings suggest that stimulation of the left DLPFC does not exert a direct influence on intertemporal decision-making, but may affect decision-making indirectly through changes in affective processes.

**Keywords:** tDCS, decision-making, impulsivity, delay discounting, reward, brain stimulation

**Presentation type:** Poster Presentation

## **Visual search is robust against auditory distraction unless we are actively listening**

Jan Philipp Röer <sup>1\*</sup>, Ian M. Thornton <sup>2</sup>, Ava Mitra <sup>3</sup>, Jeremy M. Wolfe <sup>3, 4</sup>

<sup>1</sup> *Witten/Herdecke University*, <sup>2</sup> *University of Malta*, <sup>3</sup> *Brigham and Women's Hospital*, <sup>4</sup> *Harvard Medical School*

This poster presents findings from a series of experiments on the effect of background sound on visual search. At the time of abstract submission, three of five preregistered experiments have been conducted. In all experiments, we use the Multi-Item Localization (MILO) task, in which participants click through items labeled 1-8 in numerical order as quickly as possible while hearing auditory information varying in relevance and complexity. In Experiments 1 and 2, participants were informed that any background sound was irrelevant and asked to ignore it. Auditory distractors were sequences of random words that had previously been shown to disrupt visual-verbal working memory. In Experiment 1, the items in the MILO task were static. In Experiment 2, we increased the difficulty by using a shuffle manipulation in which all items in a display were randomly repositioned after each localizing response. In these two experiments, visual search was robust against auditory distraction. In Experiment 3, participants needed to actively listen to the auditory information. In the listening condition, participants heard a news report during the MILO task and were quizzed afterwards about its content. In the counting condition, participants counted how many times a specific number was mentioned during a sports commentary. In both conditions, participants were significantly slower compared to a quiet control condition, suggesting that visual search performance cannot be effectively shielded from auditory distraction, when we are actively listen to a background sound.

**Keywords:** Visual search, visual attention, auditory distraction, irrelevant sound, auditory attention

**Presentation type:** Poster Presentation

## Feature Matters: Decoding the Shared-Feature Effect in Visual Attention

Christina Saalwirth<sup>\*</sup>, Maximilian Stefani

*Universität der Bundeswehr München*

Visual attention research has identified the shared-feature effect, where disengagement from a fixated stimulus is delayed when it shares characteristics with a target. To better understand this phenomenon, we investigated three key questions: (1) Does the effect weaken as fewer features are shared? (2) Do certain features (color, shape, object) play dominant roles? (3) How do feature combinations influence attentional capture?

We conducted an eye-tracking experiment using a visual search paradigm previously described by Saalwirth et al. (2024). Participants focused on a central picture and then searched for a target in an outer circle of six images, responding to whether the target's orientation was left or right. The central picture shared varying degrees of features with the target: none, one feature (color, shape, or object), two features (color & shape, color & object, or shape & object), or all features.

Results indicated that the shared-feature effect diminished as fewer features were shared with the target picture. Color emerged as the most prominent feature, followed by object, and shape. This hierarchy was also evident in two-feature combinations, where pairings that included the same color led to a stronger delayed disengagement. These findings enhance our understanding of the shared-feature effect's nuances and the relative importance of different stimulus features in visual attention processes.

**Keywords:** Visual attention, Disengagement, Goal, Color, Shape, Object

**Presentation type:** Poster Presentation

---

## How perceptual ability shapes memory

Chhavi Sachdeva<sup>1\*</sup>, Emily Whelan<sup>2</sup>, Rebecca Ovalle-Fresa<sup>1</sup>, Alodie Rey-Mermet<sup>1,3</sup>, Jamie Ward<sup>2</sup>, Nicolas Rothen<sup>1</sup>

<sup>1</sup> Faculty of Psychology, UniDistance Suisse, Brig, Switzerland, <sup>2</sup> School of Psychology, University of Sussex, Brighton, UK, <sup>3</sup> Vinzenz Pallotti University, Vallender, Germany

The enhanced processing account suggests a connection between visual perceptual ability and memory. This notion is supported by studies on special populations, such as grapheme-color synesthetes and color experts, whose abilities are associated with neural changes in the ventral

visual pathway. Studies have shown that these groups exhibit a distinctive profile of enhanced memory and perception, particularly when stimuli favor processing in the ventral rather than the dorsal visual pathway. Previous research suggests that grapheme-color synesthetes and color experts perform similarly, compared to non-synesthetic controls, on tasks involving color perception, spatial contrast sensitivity, and memory for color information. However, complementary predictions of the enhanced processing account regarding populations with neural changes in the dorsal visual pathway remain unexplored. This study aimed to provide a comprehensive assessment of the enhanced processing account using three tasks: visual perception, short-term memory, and long-term memory. Participants consisted of individuals with grapheme-color synesthesia, color expertise, sequence-space synesthesia, or spatial expertise. This allowed us to distinguish the effects of these groups on perception and memory. The experiment used two types of stimuli: one designed to bias processing toward the ventral visual pathway (color stimuli) and another toward the dorsal visual pathway (spatial stimuli). This design allows for the examination of double dissociations in synesthetic experiences, thereby elucidating the unique contributions of the ventral and dorsal pathways. Preliminary results will be presented and discussed in the context of representational models of perception and memory.

**Keywords:** Synesthesia, Expertise, Visual perception, Memory, Enhanced processing account

**Presentation type:** Poster Presentation

---

## How Grades Shape Students' Feedback Processing and Emotions: Insights From an Eye Tracking Study

David F. Sachs <sup>1\*</sup>, Anne C. Frenzel <sup>1</sup>, Ligia Tomazin <sup>2</sup>, Miriam Wünsch <sup>1</sup>, Anastasiya A. Lipnevich <sup>3</sup>

<sup>1</sup> *Ludwig-Maximilians-Universität München, Germany*, <sup>2</sup> *The Graduate Center, City University of New York, USA*, <sup>3</sup> *Queens College and the Graduate Center, City University of New York, USA*

This paper rests on two solid findings from the feedback literature: (1) formative feedback in the form of comments is conducive to learning, and (2) grades indicating summative performance feedback strongly impact students' emotions. Interestingly, although comments and grades are often combined on tests in educational settings, it remains unexplored if the negative emotions induced by a bad grade may hinder subsequent effective commented feedback processing. To address this gap, we collected data from  $N=37$  6<sup>th</sup> grade students who completed an English essay writing test. The essays were scored with a standardized rubric and participants with matched performance were randomly assigned to the comments-only or comments-and-grade condition.

Apart from the presentation of a numerical grade, both conditions were identical and received the same number and type of commented feedback. We assessed participants' emotional valence using two self-report items and employed eye-tracking technology to quantify depth of feedback processing (number of revisits from commented feedback to essay text). Results from multiple linear regressions with experimental condition, performance, and their interaction, as predictors for feedback revisits showed that performance strongly predicted feedback revisits in the comments-and-grade condition only ( $\beta_{\text{condition*performance}} = .37$ ). In addition, performance strongly predicted emotional valence, but, again, solely in the comments-and-grade condition ( $\beta_{\text{condition*performance}} = .58$ ). In summary, it seems that low-performing students experience stronger negative emotional outcomes when receiving a poor grade and tend to refrain from deeply processing commented feedback. Accordingly, educational interventions should specifically target the feedback processing mechanisms of these students.

**Keywords:** eye-tracking, gaze, feedback processing, performance feedback, grades, emotional valence, emotions

**Presentation type:** Poster Presentation

---

## Effectiveness of executive functions training on cognitive regulation of emotion, working memory, and mental vitality in students

Esmail Sadipour <sup>1</sup>, Faezeh Sadipour <sup>2\*</sup>

<sup>1</sup> Full Professor, Educational Psychology Department, Faculty of Psychology and Education, Allameh Tabataba'i University., <sup>2</sup> Milano-Bicocca University

One of the most important problems of students in Iran's educational system is low academic performance. This research aims to know the effectiveness of executive functions training on cognitive regulation of emotion, working memory, and mental vitality in students with low academic performance. This research method was experimental and used pre-test and post-test with control group. In this way, 40 students were selected by a simple random method from among the second-year high school students of the 2nd district of Tehran whose GPA in the first semester of 2024 was below 13 (C+). Then they were randomly divided into two groups of 20 people, experimental and control. After obtaining the code of ethics, the questionnaire of Garnefsky and Kraij (2021) was used to measure the cognitive regulation of emotion, the questionnaire of Danmin and Carpenter (1980) was used for working memory, and the questionnaire of Ryan and Frederick (1997) was used for mental vitality in the pre-test. Barkley's executive educational package (2021) were taught



in 10 one-hour sessions in the experimental group. Then a post-test was taken from both groups (there were 3 participants in the experimental group and 2 participants in the control group). Data analysis using covariance analysis showed that the experimental group's cognitive regulation of emotion, working memory, and mental vitality were significantly higher than the control group. The result is that executive function training is suggested to increase the cognitive regulation of emotion, working memory, and mental vitality of students with low academic performance.

**Keywords:** cognitive regulation of emotion, executive function, low academic performance, working memory.

**Presentation type:** Poster Presentation

---

## The effects of eye gaze on conversation initiation with a robot

Chifumi Sakata <sup>1, 2\*</sup>, Ritsuko Iwai <sup>3</sup>, Carlos Ishi <sup>3</sup>, Takashi Minato <sup>3</sup>, Takatsune Kumada <sup>4</sup>

<sup>1</sup> Central European University, <sup>2</sup> Japan Society for the Promotion of Science, <sup>3</sup> RIKEN, <sup>4</sup> Kyoto University

Previous research suggests that perceptual cues such as gazing or waving the hand affords conversation initiation (Trujillo & Holler, 2023). However, few studies have directly examined behavioral evidence supporting the affordance. We hypothesized that if eye-gaze induces conversation as a social affordance without requiring higher-order cognitive processing, then eye-gaze implemented in an artificial agent would facilitate the response. In the experiment, participants sat at a 90° angle to a robot (CommU) on its left side and worked separately at the same desk. They spoke to the robot as soon as they heard the beep sound. Before the sound, the robot repeatedly moved the head and eyes to the left and right with three different angles of perspective depending on the conditions. In the communicative condition, the angle was the same level as the participant, yielding eye gazing. In the other two conditions, the angle was either upper or lower, and it did not gaze at them even when the robot head was directed toward the participant. The sound was made on different timings. As results, the latency from the sound to their speech was significantly shorter when the sound timing was the robot's directing the head to the left than the right only in the communicative trials. This suggests that eye gaze plays an important role for conversation even with a robot partner. It implies that perceptual information of eye-gaze itself affords conversation initiation.

**Keywords:** Conversation; Eye gaze; Social affordance

**Presentation type:** Poster Presentation

---

## **Goals vs. transitions: Do desired states or desired changes drive action effect bindings?**

Moritz Schaaf <sup>1\*</sup>, Solveig Tonn <sup>1</sup>, Wilfried Kunde <sup>2</sup>, Roland Pfister <sup>1</sup>

<sup>1</sup> *Trier University*, <sup>2</sup> *University of Wuerzburg*

How do intentions turn into body movements? Ideomotor theory provides a straightforward answer: Through learning, actions become bidirectionally linked to their effects; thus, actions can be initiated by anticipating those effects. Yet, the representational format of such “effects” is still debated: While modern accounts of the ideomotor principle often emphasize the role of goal codes (i.e., anticipated end-states) historical formulations highlight the role of codes of desired changes (i.e., anticipated transitions). In fact, recent evidence from a response effect compatibility paradigm seems to favor the notion of transitional codes. However, it is possible that such transitional codes dominate only in long-term memory structures (i.e., links that are built by blockwise manipulations). To assess this possibility, we employed a prime-probe paradigm and investigated which representational format underlies short-term bindings between actions and effects.

**Keywords:** BRAC, binding, ideomotor theory, goal-based action control

**Presentation type:** Poster Presentation

---

## **Modeling Flanker Task Performance Using Deep Neural Networks**

Simon Schaefer <sup>\*</sup>, Jan Göttmann , Anna-Lena Schubert

*Johannes Gutenberg-Universität Mainz*

For decades, researchers have examined conflict processing in cognitive tasks, commonly referred to as conflict tasks. However, evidence showing diverging delta functions (Pratte et al., 2010) suggests that cognitive mechanisms differ across tasks. Unlike traditional approaches that rely solely on reaction times and error rates, computational models offer a deeper understanding by making precise mathematical assumptions about underlying cognitive processes. These models

enable researchers to test and falsify competing explanations systematically. Particularly, the Diffusion Model for Conflict tasks (DMC; Ulrich et al., 2015) has proven to be an effective tool for explaining performance in conflict tasks, as it successfully predicts diverse delta function patterns across different conflict tasks (Hübner et al., 2019). However, the DMC's application involves substantial computational effort and faces challenges in parameter recovery. In this study, we use BayesFlow (Radev et al., 2022) for Amortized Bayesian Inference to fit the DMC to behavioral data. This method provides an efficient alternative to traditional estimation techniques, as once a set of deep neural networks is trained, parameter estimation can be performed in real time. Through a simulation study, we assessed the impact of prior selection on parameter recovery, simulation-based calibration, and reliability. Additionally, we explored how stimulus spacing influences conflict-processing parameters in a flanker paradigm, confirming effects of spacing and congruency on both automatic and controlled drift rates. Our findings highlight the validity of the DMC and contribute to the existing literature by offering a novel and efficient method for parameter estimation within a Bayesian framework.

**Keywords:** Simulation-based Inference, Flanker Task, Diffusion Model for Conflict tasks, inhibition, Amortized Bayesian Inference, BayesFlow

**Presentation type:** Poster Presentation

---

## A new precueing paradigm: Impact of task preparation on multimodal precueing

Ludivine Schils <sup>1\*</sup>, Iring Koch <sup>1</sup>, Pi-Chun Huang <sup>2</sup>, Shulan Hsieh <sup>2</sup>, Denise Stephan <sup>1</sup>

<sup>1</sup> *Institute of Psychology, RWTH Aachen University, Aachen, Germany*, <sup>2</sup> *Department of Psychology, National Cheng Kung University, Tainan, Taiwan*

In traditional response precueing research, cues direct attention to a relevant subset of potential stimuli and their responses, allowing to prepare more effectively. While most studies focused on visual-spatial targets and manual responses, we designed a novel multimodal response precueing paradigm using visual and auditory precues and targets with manual or vocal responses. In this paradigm, the target modality – response modality pairing was fixed. Precues could either indicate the target modality (visual vs. auditory) and thus the response modality; or indicate the relevant target location (left or right), and thus a left or right response. We aimed to investigate whether precueing a response modality (e.g., left and right auditory precues indicating an auditory target, and thus a vocal response) would result in similar performance as precueing a response location

(e.g., left auditory and left visual precue indicating a left response –spatial precue). Performance in both conditions was compared to neutral precues. As expected, modality precues consistently led to better performance than neutral precues, while spatial precues displayed a speed-accuracy tradeoff. Unexpectedly, however, the modality precue produced a larger preparation benefit than the spatial precue. We suggest that priming the response modality enables faster and more automatic mapping between the target and its response. However, performance enhancement still occurs due to the difficulty of quickly preparing for a verbal response code of the effector modality. In contrast, we propose that priming the effector side, when there is uncertainty about which response-modality to use, lead to confusion and decreased performance.

**Keywords:** Multimodal, precuing, task-preparation

**Presentation type:** Poster Presentation

---

## Constant Auditory Noise as a Burden on Working Memory?

Philip Schmalbrock \*

*University of Trier*

Constant auditory noise accompanies many cognitive functions throughout the day. Especially from physiological research, we know that this continuous exposure has altogether negative consequences – not only directly for our auditory system but for the whole body. Conversely, less is known about how constant auditory noise affects our cognitive functions. Here, we specifically investigated how constant auditory noise affects our working memory. Working memory is not only a core function that allows us to maintain information actively. It is also the foundation for many higher-order functions. In several experiments, we explored how different types of auditory noise affect working memory performance in a spatial n-back task. Our research revealed a complex interplay that, surprisingly, yields better performance in untrained participants but requires an additional compensatory effort to maintain. These results hint at cognitive costs much more likely to occur under long-term exposure than in short intervals.

**Keywords:** Working Memory, Auditory Perception, Auditory Noise

**Presentation type:** Poster Presentation

## **ACAM — a novel Adaptive CAMpimetry technique for a fast, precise, and reliable measurement of visual field defect borders**

Doris Schmid \*, Thomas Schenk

*Ludwig-Maximilians-Universität München*

ACAM is a novel campimetry designed to improve the measurement of visual field defects (VFDs) following brain injury. Precise and efficient assessment of VFDs is essential for diagnostic purposes and to evaluate therapeutic progress (specifically for restitutive approaches). Traditional perimetry and campimetry, however, use targets presented at constant spatial intervals across the visual field, resulting both in low efficiency and low precision. ACAM improves upon this by using an adaptive procedure to increase density of target presentations near the presumed VFD-border while reducing density far from the border. Feasibility and reliability of ACAM were assessed in two experiments with healthy participants, using the natural blind spot (NBS) as a model VFD. In both experiments, ACAM was applied repeatedly to the same eye of each participant. In experiment 1 (N=22), two versions of ACAM were tested: (1) all targets within the NBS were activated, (2) only those targets at the NBS-border were activated. This modification resulted in a significantly reduced test duration. In experiment 2, we applied the border-zone version twice in 31 participants, and a third time in 15 participants. Due to the adaptive procedure, target positions differ across repetitions. Nonetheless, in both experiments, resulting NBS-centres, as well as NBS-width and -height, did not differ significantly between repetitions. Additionally, Bayes factors provided anecdotal to moderate evidence supporting the consistency of NBS-values within participants. In conclusion, ACAM provides a reliable method for measuring the NBS. Through its adaptive procedure, ACAM achieves high precision in delineating VFD-borders while keeping testing time minimal.

**Keywords:** Visual field defect, border zone, campimetry, perimetry, adaptive procedure, natural blind spot, hemianopia

**Presentation type:** Poster Presentation

## **Complex causal diagrams of faults: Strategies and challenges in reading, understanding, and applying cause-effect relations**

Judith Schmidt \*, Wiebke Klausing , Vincent Zipper , Romy Müller

*Dresden University of Technology, Chair of Engineering Psychology and Applied Cognitive Research*

To identify and correct faults in a technical system, people have to understand the underlying cause-effect relations and apply this knowledge to derive appropriate actions. Causal diagrams have previously been found to enhance people's understanding of direct and indirect causal influences. However, these diagrams are typically very small and not representative of causal relations in complex systems. How do people use large causal diagrams to identify fault causes and to draw more abstract inferences from the provided relations? What do they learn about the represented contents? To answer these questions, we conducted an experiment in which participants used a complex causal diagram (88 variables) representing cause-effect relations during chocolate production. They were asked to identify potential fault causes, and to reason about more abstract principles underlying different faults. To assess learning, participants were also asked to identify potential problems without the causal diagram. Using participants' written records and think-aloud protocols, we analyzed their strategies and challenges. Participants identified most causal relations correctly, but contrary to previous research, they often failed to identify long causal chains and indirect paths. About one third of participants were not able to derive process-related abstract principles underlying the causal relations. Finally, the results indicate that participants have learned the cause-effect relations on very low and on very high levels of functional abstraction, which are often unsuitable to derive appropriate actions. We discuss potential adaptations to address these shortcomings, and how benefits and limitations of large causal diagrams could be examined in future studies.

**Presentation type:** Poster Presentation

## **Effects of variability of emotional facial expressions during virtual attentional training in socially anxious individuals**

Teresa Schmidt \*, Theresa Friedericke Wechsler , Andreas Mühlberger

*Departement for Psychology, Clinical Psychology and Psychotherapy, University of Regensburg,  
Regensburg, Germany*

Enhanced self-focused attention combined with reduced external focus of attention plays an important role in the maintenance of Social Anxiety Disorder (SAD). Changing the attentional focus is a core element in cognitive behavioral therapy and actual treatments use Virtual Reality (VR) for attentional training. However, no VR attentional training combining eye tracking based feedback of attentional processes with exposure to public speaking has been investigated yet. Therefore, within a randomized controlled study we investigated the effects of an attentional training during public speaking in VR and examined differential effects of an attentional focus on social stimuli of variable vs. invariant valence. Within a training intervention, highly socially anxious individuals were instructed to focus on virtual audience members either of different valence (e.g., interested, bored) or only positive valence , followed by eye tracking based feedback. Using subjective, physiological, and eye tracking measures, we assessed the pre-post effects on affective reactions, self-perception and attentional processes during public speaking and general Social Anxiety. Preliminary results indicate a significant improvement in anxiety and physical reactions during public speaking, with no significant differences between the groups. Our findings suggest that attentional training with eye tracking based feedback to enhance external focus on social stimuli can be successfully conducted in VR. Both training versions could show positive short-term effects in highly socially anxious individuals. Finally, the results of this study will be used to optimize an attentional training in VR for patients with Social Anxiety to subsequently reduce symptoms in the long-term.

**Keywords:** social anxiety, self-focused attention, virtual reality, attentional training, exposure, cognitive behavioral therapy

**Presentation type:** Poster Presentation

## Investigating neuronal correlates of attention to different feature dimensions using intracranial EEG

Tobias Schoeberl <sup>1\*</sup>, Jaime Cadena-Valencia <sup>2</sup>, Ege Kingir <sup>3</sup>, Abdolmoein Esghaei <sup>1</sup>, Stefan Treue <sup>1, 4, 5</sup>

<sup>1</sup> German Primate Center, Leibniz Institute of Primate Research, Cognitive Neuroscience Laboratory, Goettingen Germany, <sup>2</sup> Universitaet Freiburg, Freiburg Swiss Confederation, <sup>3</sup> Universitaetsmedizin Goettingen, Goettingen Germany, <sup>4</sup> Leibniz-ScienceCampus Primate Cognition, Goettingen, Germany, <sup>5</sup> Bernstein Center for Computational Neuroscience, Goettingen, Germany

Visual attention can be deployed to specific feature dimensions of attended objects. It is possible, for example, to attend to the motion direction of an object without focusing on color. In the present study, nine patients with drug resistant epilepsy who underwent presurgical evaluation with intracranial electroencephalography (iEEG, 767 contact points) performed a simple change detection task. They either attended to the color or to the motion direction of one out of two superimposed random-dot patterns (RDPs) and responded to brief changes in the attended feature dimension. We show that information about the state of attention (whether motion or color was attended) is present in several frequency bands of the recordings, ranging from theta to the high gamma frequencies. This result suggests that both, suppression of task irrelevant information (as evidenced by low frequency band modulations, < 30 Hz) as well as enhancement of task relevant information (as evidenced by high frequency band modulations, > 30 Hz) is involved. Specifically, when motion was attended, we observe increased low frequency power of contact points in areas associated with color processing, indicating suppression of task irrelevant features. The reversed effect in motion sensitive areas cannot be shown, most probably due to the lack of a sufficient number of contact points in motion sensitive areas. In sum, the present results suggest that a combination of suppression and enhancement realizes attention to different feature dimensions.

**Keywords:** visual attention, feature-dimension-based attention, color processing, motion processing, intracranial EEG

**Presentation type:** Poster Presentation



## **Predictive eye movements when interacting with bouncing balls – age-related changes in the game 'Pong'**

Anna Schroeger <sup>1, 2\*</sup>, Leonard Gerharz <sup>1, 2</sup>, Dimitris Voudouris <sup>1, 2</sup>

<sup>1</sup> *Department for General Psychology, Justus Liebig University Giessen, Germany,* <sup>2</sup> *Center for Mind, Brain and Behavior, University of Marburg, Justus Liebig University Giessen and University Darmstadt, Germany*

When interacting with moving objects, humans typically visually track those objects and make predictive gaze shifts to the anticipated object's future location. For instance, when hitting a moving ball, people predictively look at the balls' bouncing location, allowing them to overcome sensorimotor delays related to hitting the ball. Such delays become increasingly pronounced with age, possibly calling for stronger reliance on predictive gaze. To investigate whether aging prompts earlier gaze shifts to positions of interest, we examined gaze and hand movements of older and younger adults who played an iPad-based version of the game 'Pong' against an automated opponent. Participants moved a paddle of two different sizes on the bottom of the tablet to intercept a ball moving in two speeds and bouncing off walls. We were mainly interested in when participants looked i) at the wall where the ball bounced before moving toward the participants' paddle, and ii) at their own paddle around interception. Both age groups hit fewer balls and looked earlier to the final wall bounce when using smaller paddles. Older participants looked later to the final wall bounce but earlier to their own paddle before interception compared to younger adults. Congruently, older adults performed less smooth pursuit shortly before interception. Together, these results suggest that aging enhances predictive gaze shifts related to the immediate action. Our results indicate that predictive gaze shifts become more pronounced when most needed, particularly during more difficult tasks, or in aging shortly before acting.

**Keywords:** eye movements, aging, motion prediction, interception

**Presentation type:** Poster Presentation

## **Task-order Coordination in Triple-Task Situations: An EEG study**

Torsten Schubert <sup>\*</sup>, Leif Langsdorf , Sebastian Kübler

*Martin-Luther-Universität Halle-Wittenberg*

Performing multiple tasks simultaneously requires task-order coordination processes for planning, organizing, and monitoring the sequence of tasks. In laboratory settings, these processes are typically studied using dual-task (DT) paradigms with a variable order of the two component tasks. A common finding that indicates the occurrence of task-order coordination is that performance tends to be impaired in order-switch trials (when the task order changes between two consecutive trials) compared to order-repetition trials (when the task order remains the same). So far, task-order coordination has only been studied in DT situations. Thus, it remains unknown whether such processes are also necessary when handling more than two tasks. To tackle this issue, we investigated the electrophysiological correlates of order coordination in a new triple-task scenario. In two experiments, we used a triple task consisting of two visual and one auditory choice reaction time tasks, presented in a variable order. In Experiment 1, we found a parietal order-switching positivity when contrasting order-switch with order-repetition trials. In addition to this order-switching positivity, in Experiment 2, we also found a slightly earlier centroparietal order-mixing positivity when comparing order-repetition trials with trials from triple-task blocks with a constant task order. These results provide physiological evidence for the assumption that task-order coordination processes are also involved in the processing of more than two tasks.

**Keywords:** dual task, triple task, task-order coordination, executive functions, cognitive control

**Presentation type:** Poster Presentation

---

## **Perceived control in voting situations**

Katharina Schwarz <sup>1, 2\*</sup>, Leonhard Höhnel <sup>2</sup>, Moritz Reis <sup>2</sup>

<sup>1</sup> *Trier University*, <sup>2</sup> *University of Würzburg*

Modern day democracies rely on citizens perceiving the responsibility to take part in election processes. To increase voter turnouts, activating voter motivation is thus key. A crucial, inherent motivator to choose specific behavior, or to act at all, is our experienced effectiveness regarding that behavior, i.e., our sense of agency (SoA). However, in voting situations in which many voters cast their vote, the association between action, consequence, and causal agent becomes blurred,

presumably reducing our perception of control, a key aspect of SoA. So, how can we design voting situations that optimize our perceived control? Which situational variables affect our perceived control in voting situations, from the number of voting options over experience in specific voting systems to the number of presumed co-voters? And how do these results relate to empirical evidence on SoA formation outside of voting situations?

The presented study demonstrates that there are various, seemingly general aspects affecting SoA formation that extend also to voting situations. Thus, perceived control differs depending on voting conditions, identifying key aspects affecting voter motivation and, potentially, political engagement.

**Keywords:** sense of agency, perceived control, motivation, voting

**Presentation type:** Poster Presentation

---

## **Influence of negative and positive ambient scent on wayfinding performance**

Mira Schwarz \*

*Allgemeine Psychologie und Kognitionsforschung; Justus-Liebig-Universität Gießen*

This study investigates the influence of unconsciously perceived ambient scents on human wayfinding performance. Participants learned a route through a virtual maze using landmarks in either weakly scented (butyric acid, lavender) or non-scented test cabins. Their route memory was tested immediately after the learning phase and one month later. Additionally, participants completed an implicit odor memory task, rating the fit between seven odors, including the ambient scents, and ten different surroundings, including the test cabin. They labeled the odors and recalled where and when they had last smelled them. Participants who remembered smelling these odors in the test cabin were excluded from the analyses. Results showed that the ambient odors influenced fit ratings, with significantly higher ratings between the visual context of the test cabin and the respective ambient odor in the scented conditions than in the no-scent condition. This suggests that the ambient scents were perceived implicitly, as the remaining participants could not report any conscious recollection of them. The ambient scent butyric acid significantly improved wayfinding performance, while lavender had no significant impact. No clear evidence was found for the effects of ambient scents on forgetting dynamics over a one-month period. Our findings, underscoring the critical role of olfaction in human wayfinding, will be discussed in detail with implications for future research.

**Keywords:** Wayfinding, Spatial Cognition, Olfaction, Landmark, Olfactory imagery, Implicit Memory

**Presentation type:** Poster Presentation

## **Investigating the role of vision in the size-weight illusion**

Franz-Peter Schwarzacher \*, Thomas Schenk

*Klinische Neuropsychologie, Ludwig-Maximilians-Universität München*

**Introduction:** The size-weight illusion (SWI) describes the observation that smaller objects are perceived as heavier than bigger objects that have the same weight after having been lifted. The origin of this illusion is still debated. A key question is what type of sensory information is needed to create a robust SWI. Previous research demonstrated that SWI occurs even when the object is neither seen nor felt during its lift (Buckingham & Goodale, 2010). This finding is surprising but also difficult to interpret given that some aspects of the previous study might have allowed observers to feel the difference between different objects. At the same time, full occlusion of the entire scene also reduced grip accuracy, thereby contaminating the data from load and grip forces. **Methods:** We re-examined the role of vision while aiming to avoid the potential problems of the previous study. We ensured that no haptic information about object identity was revealed during the grasp and also introduced a second vision condition that allowed vision of the grip-sensor, thereby allowing ideal grip accuracy, while still preventing vision of the object. **Results:** We found that under these conditions, the SWI was diminished whenever vision of the object during lift was reduced. **Discussion:** We will discuss the implications of our findings for our understanding of the role of vision and haptic feedback in creating the SWI.

Buckingham, G., & Goodale, M. A. (2010). PLoS ONE, 5(3), 3–6.

<https://doi.org/10.1371/journal.pone.0009709>

**Keywords:** Size-weight illusion, Heaviness perception, Perceptual illusion, Grip force, Grasping

**Presentation type:** Poster Presentation

## **Do negation-based pragmatic inferences affect attitude formation towards individuals?**

Emanuel Schütt \*, Francesca Cardaropoli , Eva Widmann , Parker Smith , Carolin Dudschig ,  
Barbara Kaup  
*University of Tübingen*

One common reason to use negation is to express that something differs from our expectations. For instance, uttering a negated sentence such as “John is not violent” is adequate if the speaker indeed believed that John is a violent person (e.g., since John is a member of a criminal gang). In our research, we investigated whether recipients infer from negated utterances that the speaker must have had good reasons to assume that the information under the scope of negation is a plausible alternative, potentially affecting the recipient’s attitude formation towards the individual talked about. Participants were presented with photos of individuals and short verbal descriptions varying in polarity (negated vs. affirmative) and valence (negative vs. neutral vs. positive). If negation-based pragmatic inferences really occur, we hypothesized that (1) individuals described with negated sentences involving negative attributes (e.g., “Sam is not cruel”) should get more negative likeability ratings than individuals described with negated sentences involving neutral attributes (e.g., “Sam is not right-handed”) and (2) individuals described with negated sentences involving positive attributes (e.g., “Isabelle is not honest”) should get more positive likeability ratings than individuals described with negated sentences involving neutral attributes (e.g., “Isabelle doesn’t have many neighbors”). However, the results did not match these predictions and rather resembled prior findings from semantics suggesting that negating an adjective conveys a mitigated meaning of its antonym. This challenges the idea that pragmatic reasoning of the kind we propose is involved in attitude formation from negated utterances.

**Keywords:** language, pragmatics, negation, attitude formation

**Presentation type:** Poster Presentation

## **Investigating boundary conditions for the alerting-congruency interaction: The role of alerting signal modality and task stimulus modality**

Nadja Spannowsky , Verena Carola Seibold \*

*University of Tübingen*

It has been shown that phasic alerting increases congruency effects in some conflict tasks (e.g., Simon and arrow flanker tasks), but not in others (e.g., symbol flanker tasks). In attempts to find explanations for this puzzling observation, research has mainly focused on the role of spatial information processing in the alerting-congruency interaction. In contrast, the role of stimulus modality, in particular alerting signal (AS) modality, has not been considered systematically so far. In this experiment, we investigated specifically the effects of both AS modality and task stimulus modality on the alerting-congruency interaction. Our experiment had two parts: In the first part, we let participants (N = 36) perform a speeded detection task using visual and auditory stimuli of varying intensity to create intensity-matched stimuli that served as AS in the second part. In the second part, participants performed a visual or auditory Simon task, with task stimulus modality changing across blocks. Within each block, we induced phasic alerting by presenting an auditory or visual AS in half of the trials. We observed a larger congruency effect with AS than without AS. Importantly, AS modality did not modulate this interaction, suggesting that both visual and auditory AS were effective in modulating congruency effects. Interestingly though, there was some indication of an influence of task stimulus modality on the alerting-congruency interaction. This latter result may be attributed to (modality) differences in the time course of automatic response code activation, which may alter the effectiveness of phasic alerting in influencing response selection.

**Keywords:** alerting, selective attention, response conflict, Simon task, congruency effect, stimulus modality

**Presentation type:** Poster Presentation

## **Reduced perception of sensory information drives boredom in health and attention deficit hyperactivity disorder**

Johannes P.-H. Seiler <sup>1, 2\*</sup>, Jonas Elpelt <sup>3</sup>, Matthias Kaschube <sup>3</sup>, Oliver Tüscher <sup>2, 4, 5</sup>, Simon Rumpel

<sup>1</sup>

*<sup>1</sup> Institute of Physiology Focus Program Translational Neurosciences University Medical Center of the Johannes Gutenberg University Mainz Duesbergweg 6 55128 Mainz, <sup>2</sup> Department of Psychiatry and Psychotherapy University Medical Center of the Johannes Gutenberg University Mainz Untere Zahlbacher Straße 8 55131 Mainz, <sup>3</sup> Frankfurt Institute for Advanced Studies and Institute for Computer Science Goethe University Frankfurt Ruth-Moufang-Straße 1 60438 Frankfurt, <sup>4</sup> Department of Psychiatry, Psychotherapy and Psychosomatic Medicine University Medicine Halle Martin-Luther University Halle-Wittenberg, <sup>5</sup> Leibniz Institute for Resilience Research Wallstraße 7 55122 Mainz*

Boredom is a ubiquitous human experience that has been defined as an aversive mental state, typically induced by monotonous environments. While under physiological conditions, transient boredom experience is thought to enhance exploration and creativity, chronically increased boredom is significantly associated to a variety of psychopathologies, including attention deficit hyperactivity disorder (ADHD). Despite these psychosocial implications, the current understanding of the situational and cognitive underpinnings of boredom remains qualitative, in particular due to the lack of standardized psychophysical assessment tools to quantify boredom and its determinants.

In our work, we overcome this problem by presenting a novel behavioral paradigm to quantify individual boredom under defined environmental conditions. Specifically, we expose human subjects to stimuli with defined objective information content, while assessing individual boredom-related behavior and sentiment. We apply information theoretic measures to formalize external and internal factors of information transmission, finding that the information content of encountered stimuli, measured as empirical entropy, together with the personality structure of individuals are key drivers of boredom experience. Comparing the behavior of healthy subjects to a cohort of adult ADHD patients, we demonstrate that ADHD patients are characterized by reduced abilities to perceive information from sensory stimuli, predisposing them for higher boredom proneness. Taken together, we delineate how individual traits and external stimulus features interact in the transmission of sensory information, identifying boredom as an affective response to states of low information transmission, which is aggravated in ADHD.

**Keywords:** boredom, decision-making, information-seeking, exploration, attention deficit hyperactivity disorder, information theory

**Presentation type:** Poster Presentation

---

## Early visual cortex is recruited to act as a comparison circuit between mental representations and visual inputs

Maria Servetnik <sup>1, 2\*</sup>, Rosanne Rademaker <sup>1</sup>

<sup>1</sup> *Ernst Strüngmann Institute for Neuroscience in cooperation with the Max Planck Society, Frankfurt, Germany,* <sup>2</sup> *Vrije Universiteit Amsterdam, Amsterdam, Netherlands*

Imagine briefly losing your friend in a crowd: As you scan one face after another, you compare each input to a mental image of your friend's face. This process spans multiple cognitive domains, from perception to working memory and visual search. Early visual cortex (EVC), the primary cortical site for processing visual inputs, has been implicated in the maintenance of mental visual representations. An outstanding question is why? We hypothesize that EVC is recruited for mental representations to serve as a comparison circuit, matching mental content to incoming sensory information in a visual format native to EVC. To test this, we collected fMRI data while participants (N=5) remembered the direction of a coherent random dot motion (RDM) stimulus for 8 minutes. During this period, participants saw 48 new RDM stimuli with independent motion directions and were cued to either compare a probe's motion direction to the one they were holding in mind, or to withhold a comparison. Results show that BOLD responses for comparisons were higher than for non-comparisons throughout EVC. Importantly, making a comparison also rendered the motion direction held in mind significantly more decodable. This suggests that EVC is recruited to represent mental content when it needs to be compared to visual input. The role of EVC as a comparison circuit highlights that memories are typically stored for use, and that a broader cognitive context must be considered in order to accurately uncover how the brain represents mental content.

**Keywords:** visual working memory, early visual cortex, fMRI

**Presentation type:** Poster Presentation



## Effects of different movement amplitudes on sequence learning in the motor domain

Zixin Shen <sup>1\*</sup>, Christoph Schütz <sup>1, 2</sup>

<sup>1</sup> Bielefeld University, Faculty of Psychology and Sports Science, <sup>2</sup> Bielefeld University, CITEC, Center for Cognitive Interaction Technology

Sequence learning in the perceptual domain has been demonstrated to be affected by stimulus intensity. In the present study, we investigated whether this is also true in the motor domain. To this end, we tested the effect of different amplitudes on motor sequence learning. Response time (RT) was measured in a sequential button-pressing task. Perceptual learning was prevented by random color assignments to the buttons in each trial. Sequence blocks used a list with two randomized and four sequential elements; random blocks used a fully randomized list. Participants (n=44, mean age=24.63, 13 male) were randomly assigned to the large or small amplitude groups. A mixed 2 (block: sequence vs random) \* 2 (group: large vs small) ANOVA on the RT showed a main effect of block,  $F(1,42)=6.736$ ,  $p=.013$ ,  $\eta_p^2=0.138$ , but no block\*group interaction,  $F(1,42)=0.373$ ,  $p=.545$ ,  $\eta_p^2=0.009$ , indicating that both groups learned the sequence. A mixed 2 (element subtype: sequential vs randomized) \* 2 (group) ANOVA on the RT within the sequence block showed a main effect of subtype,  $F(1,42)=5.610$ ,  $p=.023$ ,  $\eta_p^2=0.118$ , and a subtype\*group interaction,  $F(1,42)=6.683$ ,  $p=.013$ ,  $\eta_p^2=0.137$ . For the large amplitude group, RT for the sequential elements was significantly shorter than for the randomized elements, whereas there was no difference for the small amplitude group. Our findings show that the motor sequence was learned similarly for both large and small movement amplitudes, but that learning of the sequential elements specifically was found only for large amplitudes.

**Keywords:** sequence learning, motor learning, movement amplitudes

**Presentation type:** Poster Presentation

## **No action based Evaluative Conditioning with foot responses**

Tarini Singh \*, Eva Walther , Christian Frings

*Trier University*

Evaluative conditioning (EC) refers to changes in the liking of an object due to the repeated pairing of that object with affective stimuli. Most EC research has largely focused on stimulus-stimulus pairings, while neglecting actions. However, humans are not simply passive perceivers of information, rather they actively interact with objects in their environment. Therefore, it is likely that affective actions also lead to EC. Action control theories, postulating the integration of stimulus and response features, provide a framework for such action based EC. However, till date studies mainly relied on hands as effectors. Since action control theories would assume integration of stimulus and response features irrespective of the specific effector, it is likely that foot responses, like hand responses, might lead to EC. On the other hand, since humans mainly interact with objects with the hands rather than the feet, it is possible that foot responses do not transfer affective information to neutral stimuli as readily as hands. The aim of the present study, therefore, was to test whether responding to neutral stimuli with affectively conditioned foot responses also leads to EC. Participants underwent an EC procedure after which EC effects were measured using explicit ratings. Additionally, affective conditioning of the foot responses was measured using a compatibility task. Although no EC effects were observed in the explicit ratings, the compatibility task indicated successful affective conditioning of the foot responses. The present findings indicate that although foot responses can be affectively conditioned, they might not lead to EC.

**Keywords:** evaluative conditioning, action control

**Presentation type:** Poster Presentation

---

## **Context events bypass the influence of visual adaptation on the perception of causality**

Ben Sommer \*, Martin Rolfs , Sven Ohl

*Humboldt-Universität zu Berlin, Germany*

When a moving disc stops right next to a second disc that then starts moving in the same direction, we typically perceive a causal *launch*. Increasing spatial overlap between the two discs reduces the

perception of launches such that one disc appears to *pass* over the other. This basic phenomenology is subject to contextual influences. The impression of a pass can be switched to a launch by presenting a launching context event simultaneously with the test event (Scholl & Nakayama, 2002). Here we investigated the impact of visual adaptation to launches (Rolfs, Dambacher, & Cavanagh, 2013) on these contextual influences.

We presented test events with parametrically varying amounts of disc overlap and asked observers to report whether they perceived a causal launch or non-causal pass—allowing us to obtain psychometric functions for the perception of causality. Before adaptation, a simultaneous launch context event increased (while a pass context event decreased) the proportion of reported launches in ambiguous events. Subsequent adaptation significantly decreased the proportion of reported launches in trials without a context event. However, simultaneous launch context events counteracted the influence of visual adaptation, such that the proportion of reported launches was unaffected by the visual adaptation.

Thus, attenuating the perception of causality did not abolish contextual influences. On the contrary, contextual influences emerged strongest after adaptation. We conclude that weaker evidence for the presence of a causal interaction at the test event location—here induced by adaptation to launches—increased the influence of context on the perception of causality.

**Keywords:** perception, causality, visual adaptation

**Presentation type:** Poster Presentation

---

## From slow motion to time lapse: exploring judgment biases in video speed perception

Laura Sperl \*, Verena Steinhof , Roman Liepelt

*FernUniversität Hagen, Allgemeine Psychologie: Urteilen, Entscheiden, Handeln*

While decades of research have deepened our understanding of time perception, the perception of (manipulated) video speed remains a relatively new and underexplored topic. Fueled by technological advances, the use of slow motion or time lapse, are now common tools in daily life, offering the option for detailed video analysis. Yet, recent research highlights potential biases in perception and low sensitivity to altered video speed.

To investigate to which extent humans can perceive altered video speeds and how different video speeds influence duration experience, we conducted a series of experiments where participants

viewed short video clips at different video speeds. Our results demonstrate systematic biases: overestimation of video speed during slow motion and underestimation of video speed when watching time lapse versions, intensifying with greater deviations from the original speed. Moreover, duration estimations systematically varied depending on video speed, as slow motion videos were perceived to last shorter than videos at normal or accelerated speeds, suggesting a recalibration mechanism occurring already during viewing. Both effects seem to result in an erroneous “mental backwards calculation” in the attempt to infer the true duration of an event. This results in a distorted impression about the time that had actually elapsed, which, in turn, typically influences, for example, how intentional an action is perceived to be. These biases have broader implications for time perception in general and for applied fields such as law and sports, where judgments are often based on modern video analysis and hence require careful consideration.

**Keywords:** video speed, slow motion, time lapse, bias, time perception

**Presentation type:** Poster Presentation

---

## How Does Statistical Learning Shape Attentional Tuning to Depth in 3D Visual Search?

Maximilian Stefani <sup>1\*</sup>, Marian Sauter <sup>2</sup>, Sven Kielmann <sup>1</sup>, Wolfgang Mack <sup>1</sup>

<sup>1</sup> *Universität der Bundeswehr München*, <sup>2</sup> *Universität Ulm*

This study investigates whether statistical learning can tune attention to specific depth planes during visual search tasks in a virtual reality (VR) environment. Using VR to present a three-dimensional search space, we tested in two experiments whether the spatial distribution of targets and distractors across depth planes could be learned and utilized to improve search efficiency. The first experiment demonstrated that participants identified targets faster when they appeared more frequently on a specific depth plane, suggesting that statistical learning effectively guided attention allocation. The second experiment assessed the interference caused by distractors placed at varying depths. While the results did not reach statistical significance, there was a trend toward reduced distractor interference from less frequent and deeper depth planes. These findings indicate that attention allocation in 3D environments can be flexibly modulated by statistical regularities in depth, advancing our understanding of attentional control in complex perceptual spaces. VR offers a powerful tool for exploring these processes in immersive, ecologically valid scenarios.

**Keywords:** Statistical Learning, Visual Search, Depth Perception, Virtual Reality, Attention Tuning, 3D Environments, Depth Planes

**Presentation type:** Poster Presentation

---

## Real vs. simulated - Cyclists' perception while being overtaken

Frederike Hanna Strelow \*, Mark Vollrath

TU Braunschweig

When cyclists are overtaken at close distances by motorized vehicles, the narrow space increases the impact of aerodynamic forces, which can destabilize cyclists or lead to accidents (Gromke & Ruck, 2021). Beyond the objective risks, such situations can be stressful or even perceived as “very scary”, even without a collision (Aldred, 2016). The aim of this research is to investigate how overtaking distance affects cyclists' subjective safety, comparing real traffic and simulated conditions.

For this, two complementary studies were conducted. First, in a semi-naturalistic field study, an instrumented bicycle equipped with OpenBikeSensor technology (OpenBikeSensor e.V., 2023) was used to measure overtaking distances during cycling in urban traffic. Cyclists ( $N = 38$ ) rated their mental comfort immediately after being overtaken by motor vehicles. Second, in an experimental study in a bicycle simulator, overtaking distances were systematically varied between 1.0 and 2.0 m, with participants ( $N = 50$ ) assessing their perceived safety.

Results show larger overtaking distances significantly enhance cyclists' mental comfort and perceived safety, particularly beyond 1.5 m. They also confirm the validity of the bike simulator as a tool for assessing subjective experience in overtaking scenarios, with participants' responses closely mirroring those observed in real-world traffic.

### References

- Aldred, R. (2016). Cycling near misses: Their frequency, impact, and prevention. *Transportation Research Part A: Policy and Practice*, 90, 69–83. <https://doi.org/10.1016/j.tra.2016.04.016>
- Gromke, C., & Ruck, B. (2021). Passenger car-induced lateral aerodynamic loads on cyclists during overtaking. *Journal of Wind Engineering and Industrial Aerodynamics*, 209. <https://doi.org/10.1016/j.jweia.2020.104489>
- OpenBikeSensor e.V. (2023). OpenBikeSensor. <https://www.openbikesensor.org/>

**Keywords:** cyclists safety, overtaking, field study, simulator study

**Presentation type:** Poster Presentation

## **Does engagement to a target or disengagement from a distractor drive the reduction of attention switch cost with preparation?**

Amy Strivens <sup>1\*</sup>, Aureliu Lavric <sup>2</sup>, Iring Koch <sup>3</sup>

<sup>1</sup> *Tübingen University*, <sup>2</sup> *University of Exeter*, <sup>3</sup> *RWTH Aachen University*

Recent studies showed that having more preparation time during the cue-stimulus interval (CSI) can reduce the performance cost of switching attention between simultaneous voices – the so-called attention “switch cost”. Having established a benefit of preparation on the switch cost, we investigated how the CSI is used for preparing to direct attention on trials where the target speaker or location switches. There are two potential processes that could benefit from longer preparation: disengaging attention from the previously relevant voice and engaging attention to the newly relevant voice. To distinguish which of these processes underlies the reduction in attention switch cost with preparation, we used a cued attention switching paradigm in two experiments where, on each trial, voices would come simultaneously from two of three possible speakers (Experiment 1) or two of three possible locations (Experiment 2). By cuing either the identity/location of the target voice (in repeat and switch-to conditions) or a switch away from the previous target identity/location (in the switch-away condition), we could distinguish between disengagement of attention from the previous voice and engagement of attention to the new voice. In both experiments, we found that increased preparation time with switch-away cues reduced switch costs (relative to the repetition cue condition). Somewhat surprisingly, this effect was weaker in the switch-to condition (but these switch costs are not directly comparable due to the difference in working memory demand between these conditions). These data suggest that attentional disengagement is sufficient to produce a preparatory reduction of auditory attention switch cost.

**Keywords:** Auditory attention, attention switching, preparation

**Presentation type:** Poster Presentation

## **Cognitive Processes Underlying the Repetition-Based Truth Effect: A Diffusion Model Study**

Annika Stump <sup>1\*</sup>, Lukas Schumacher <sup>2</sup>, Andreas Voss <sup>3</sup>, Karl Christoph Klauer <sup>1</sup>

<sup>1</sup> *University of Freiburg*, <sup>2</sup> *University of Basel*, <sup>3</sup> *Heidelberg University*

People are more likely to judge repeated information as true compared to new information. This so-called truth effect can be mainly attributed to the experienced fluency during the processing of repeated (vs. novel) information and is substantially moderated by the retention interval length between information presentations. In the present research, we systematically manipulated (a) the repetition status of the presented information and (b) the length of the retention interval between first exposure and the judgment phases within participants. During the judgment phases, we measured response times from the information onset until participants provided a binary judgment ("true" vs. "false"). This allowed us to analyze our data using a hierarchical diffusion modeling approach to estimate effects of repetition on specific cognitive processes during truth evaluations. Our results indicate that information repetition results in faster encoding and enhanced speed of information accumulation supporting the veracity of a statement – both of which are reduced with increased interval length.

**Keywords:** truth judgments, information repetition, truth effect, retention interval, cognitive processes, diffusion model

**Presentation type:** Poster Presentation

---

## **The similarity of similarity - a systematic comparison of eight tasks.**

Malin Styrnal <sup>1, 2\*</sup>, Laura Stoinski <sup>2</sup>, Philipp Kaniuth <sup>2</sup>, Martin N. Hebart <sup>1, 2, 3</sup>

<sup>1</sup> *Justus Liebig University Giessen*, <sup>2</sup> *Max Planck Institute for Human Cognitive and Brain Sciences, Leipzig*, <sup>3</sup> *Center for Mind, Brain and Behavior, Universities of Marburg, Giessen and Darmstadt*

Similarity tasks are widely used in the field of psychology, for example when studying mental representations, object recognition, or semantic processing and categorization. When collecting similarity judgments, one needs to decide which task one should choose, be it pairwise similarity ratings, odd-one-out judgments, distance-based measures, or response time tasks. Despite their regular use, to date little is known about how these tasks relate and the degree to which they

measure the same underlying construct. To address this challenge, here we systematically compared eight different similarity tasks: (1) pairwise ratings, (2) pile sorting, (3) single and (4) multiple arrangement, (5) triplet odd-one-out judgments, (6) sequential forced choice similarity judgments, (7) speeded visual search and (8) speeded same-different judgments. We collected data from 100 online participants for each of the tasks using a set of natural and colored object images from the THINGS database. We analyzed the similarity estimates between tasks and their alignment with deep neural network representations and a semantic embedding, respectively. Our findings reveal that these tasks can be grouped into three types: (1) tasks that primarily capture visual features (response time tasks), (2) tasks that primarily capture semantic features (sorting tasks) and (3) tasks that capture both visual and semantic features (choice tasks). Within each group of tasks, we additionally determined their relative reliability and efficiency to support researchers with their choice of paradigm. Together, this work reveals the nature of the representations measured by different similarity tasks and provides suggestions for choosing one task over another.

**Keywords:** similarity measures, object similarity, methods, visual perception

**Presentation type:** Poster Presentation

---

## Learning semantic and low-level cues in contextual cueing with real-life scenes

Felice Tavera \*, Hilde Haider

*University of Cologne*

What are the boundaries of implicit learning of contingencies? We could show in previous work that visual features, such as color and shape of distractors, can be learned to predict a target location in a visual search task. In the present study, in an adapted contextual cueing paradigm, we tested whether participants can learn such contingencies in complex, real-life scenes. In a first experiment, the contingency was between predominant color of a scene, and target location. In a second experiment, the scene category (bathroom, kitchen, bedroom, living room) predicted the target location. Participants were either explicitly instructed to learn these contingencies (explicit learning condition) or not informed about any contingencies in the task (implicit learning condition). We found evidence for implicit learning of low-level feature cues, but for semantic cues, learning was only evident in the explicit learning condition. In the implicit learning conditions, we found no evidence for



explicit knowledge of the contingencies. We discuss our findings against the background of theories of consciousness and frameworks of implicit learning mechanisms.

**Keywords:** implicit learning, contextual cueing, contingency learning

**Presentation type:** Poster Presentation

---

## The effect of set size on individual object and ensemble perception in naturalistic scenes

Yanina Elise Tena Garcia <sup>\*</sup>, Bianca Baltaretu , Katja Fiehler

*Justus-Liebig-Universität Gießen*

Individual and ensemble perception are key processes for successful interaction with objects in our environment that focus on single objects or the extraction of summary information from groups of objects, respectively. The underlying mechanism(s) are still being investigated, including how the perception of individual versus ensembles is impacted by the number of target objects. While previous studies have used primarily simplistic stimuli, it is unknown how this translates to the real world. To address this gap, we conducted a computer-based experiment where participants had to remember and indicate via mouseclick either the position of a single object or the average position of all target objects within a naturalistic scene. We investigated differences in individual versus ensemble perception as they relate to scene encoding (initial scene presentation time: 50, 100, or 800 ms) and set size (3, 6, or 10 objects). Results indicated that scene encoding time had a similar effect on both, individual and ensemble locating accuracy, which increased with more encoding time. However, set size modulations revealed distinct effects on the two processes: For individual perception, locating accuracy was generally higher and improved for smaller set sizes. In contrast, for ensemble perception, smaller set sizes were associated with lower locating accuracy, particularly at shorter encoding times such as 50 ms. These findings suggest that individual and ensemble perception is influenced differently by the (amount of) task-relevant information. Ultimately, this points to a complementarity of these processes, in supporting real-world actions under different contexts.

**Keywords:** ensemble perception, spatial perception, scene perception, perception & action, time & numerosity

**Presentation type:** Poster Presentation

---

## **What primes instructed prevention actions? The presence or absence of the prevented event?**

Solveig Tonn <sup>1\*</sup>, Viola Mocke <sup>2</sup>, Moritz Schaaf <sup>1</sup>, Wilfried Kunde <sup>2</sup>

<sup>1</sup> *Trier University*, <sup>2</sup> *University of Wuerzburg*

There is ample evidence that actions are primed by perceiving the events they are known to produce. However, when humans act, they not only produce certain perceptual events, they also prevent other perceptual events from occurring. But how can models of effect-based action control account for this defining property of prevention actions, for this deliberate not-occurrence of a certain event? Here, we explored this question by investigating whether actions that aim at preventing a certain event are primed by the presence of that prevented event, or the presence of another event that logically follows from the absence of the prevented event. Participants were instructed that each of two keypresses prevented a certain letter. Additionally, they could perceive that each keypress not only prevented the instructed letter but also produced the respectively other letter. In an unrelated classification task, participants had to classify these letters by executing the very same actions. We found actions were facilitated by encountering the letter that was known to be prevented by it, as compared to the letter that was known to be produced by it. The results suggest that the representation of prevention actions relies on the presence of the event that the action intends to prevent. This is in line with the notion that ideomotor linkages resulting from instructions are based on links between actions and specific effect components, but these effect components do not necessarily comply with perceivable environmental events that the actions are known to produce.

**Keywords:** prevention action, absent event, ideomotor theory, congruency effect

**Presentation type:** Poster Presentation

## Sequence learning without consciousness

Darinka Trübutschek <sup>1\*</sup>, Ricardo Kienitz <sup>4</sup>, Maximilian Winkler <sup>1, 4</sup>, Sümeyye Öztürk <sup>1</sup>, Lucia Melloni <sup>1,</sup>

<sup>2, 3</sup>

<sup>1</sup> 1. Research Group Neural Circuits, Consciousness, and Cognition, Max Planck Institute for Empirical Aesthetics, Frankfurt am Main, Germany, <sup>2</sup> Department of Neurology, New York University Grossman School of Medicine, New York US, <sup>3</sup> Predictive Brain Department, Research Center One Health Ruhr, University Alliance Ruhr, Psychology Faculty, Ruhr-Universität Bochum, <sup>4</sup> Epilepsy Center Frankfurt Rhine-Main, Center of Neurology and Neurosurgery, Goethe University, 60528 Frankfurt/Main, Germany

The ability to detect and use environmental patterns is critical for survival and central to many cognitive functions, including those unique to humans. We build cognitive maps from regularities in object positions to navigate our surroundings (e.g., chairs near tables) and segment continuous speech into words based on recurring phoneme patterns. This statistical learning often happens implicitly - without intention or clear awareness of the learned patterns - and is preserved across species, developmental stages and states of consciousness (e.g., coma, wakefulness). However, it remains unknown whether conscious awareness of inputs is necessary for statistical learning. Can patterns presented below the threshold of conscious perception still be learned? Here, we built on recent evidence for non-conscious working memory to test whether non-conscious perception supports sequence learning. Combining behavioral and eye-tracking measures, we found clear signatures for non-conscious learning of spatial sequences: After exposure to fixed pairs of target locations, human observers accurately guessed the second target when cued with the first - even when they reported not having seen the sequence. This above-chance localization was accompanied by anticipatory eye-movement signals toward the second target, suggesting non-conscious prediction mechanisms. These findings extend our understanding of non-conscious working memory and demonstrate that statistical learning may occur even in the absence of conscious perception, highlighting the broader role non-conscious processes play in shaping cognition.

**Keywords:** statistical learning, non-conscious working memory, perception-memory interactions, eye-tracking, machine learning

**Presentation type:** Poster Presentation

## Modality-dependent age differences in emotion categorization of dynamic, bimodal expressions

Nikol Tsenkova <sup>1\*</sup>, Christina Kauschke <sup>2</sup>, Daniela Bahn <sup>2</sup>, Jutta Billino <sup>3</sup>, Gudrun Schwarzer <sup>1</sup>

<sup>1</sup> *Department of Developmental Psychology, Justus-Liebig-University Gießen, Germany,* <sup>2</sup> *Department of German Linguistics, Philipps-University Marburg, Germany,* <sup>3</sup> *Department of General Psychology, Justus-Liebig-University Gießen, Germany*

Research on emotion perception has shown that while children are faster and more accurate with positive expressions (positivity bias), young adults show negativity bias. However, these findings stem from static unimodal stimuli, overlooking emotions' dynamic and diverse nature.

This emotion categorization experiment aimed to determine whether these biases would appear with dynamic expressions and whether a bimodal condition would be more beneficial than a unimodal one, we created a dataset of avatars expressing anger, sadness, happiness, and happy-surprise in two conditions: visual (facial expression), and visual-verbal (facial and verbal expression). We tested 75 participants across three age groups (children, young, and older adults) measuring accuracy and reaction times.

We did not find biases in the young adult group.

Children were more accurate with the positive visual-verbal condition than the negative visual ( $p=.012$ ), suggesting a positivity bias. They were also faster with positive visual expressions compared to negative and with negative visual-verbal conditions compared to positive.

Older adults were more accurate with negative visual-verbal expressions compared to positive ( $p<.001$ ), suggesting a negativity bias. They were also more accurate in positive visual than visual-verbal conditions, and with negative visual-verbal expressions than with visual. Their RTs supported their accuracy results.

While children retained the positivity bias, older adults showed a negativity bias along with more nuanced modality-dependent preferences. These findings suggest that additional information is only relevant for specific emotions and specific age groups. Overall, the addition of dynamic presentation and verbal components produced a greater differentiation in the previously reported biases.

**Keywords:** emotion perception, lifespan, developmental differences, facial expressions

**Presentation type:** Poster Presentation

## **The Removal of Retroactive Cuing Effects when Jointly Acting with a Competent or Collaborative Partner**

Dorothy Gao , Miles Tufft \*

*Department of Experimental Psychology, University College London*

Social offloading has been proposed as a process by which individuals engaged in joint action are able to selectively de-prioritise co-actor task information so as to enhance cognitive efficiency (Tufft and Richardson, 2020). Previous work using the picture-word interference paradigm has shown how distractor interference is removed when participants believed they were the targets of a co-acting partner. We build on these findings using an adapted version of the retroactive cuing (RAC) paradigm.

In the RAC task, participants are presented with two polygon shapes, one on the left and one on the right of a visual display. After 250ms, a central left or right pointing arrow cue is presented followed by a target polygon on the left or right side. Participants must judge if this target is the same or different as the preceding polygon at the same location. Improved performance is found when targets are presented at validly cued locations (same side). In our adapted version, central arrows were replaced by exogenous cues (red dots) presented on the left or right side. Participants were told these represented the gaze of a co-acting partner who they believed were working with them on the task. Remarkably, rather than improvement, we found reduced sensitivity to validly cued locations but only when participants believed their partner was competent or working collaboratively as team. We interpret these results as a further example of social offloading in which locations deemed to be gazed at by an appropriate partner are de-prioritised, supporting a division of labour.

**Keywords:** Working Memory, Joint Action, Social Context, Cognitive Offloading, Distributed Cognition

**Presentation type:** Poster Presentation

---

## **Time-to-collision estimation in the Oppel-Kundt illusion**

Christoph von Castell \*, Carolin Sweeney , Heiko Hecht

*Johannes Gutenberg Universität Mainz*

A previous study showed that the Sanders parallelogram illusion has an effect on time-to-collision (TTC) estimation equivalent to that of the spatial illusion. In the current study, we investigated the

effects of the Oppel-Kundt illusion (OKI) on TTC estimation. In the OKI, a horizontal interval between two vertical lines that is filled with additional vertical lines appears larger than an adjacent empty interval of the same extent. In each of the 540 trials, a circular object moved from left to right at three different speeds and was occluded at the end of the left interval. The length of the left and the right interval and their filling (filled vs. empty) were varied independently. The participants' ( $N = 30$ ) task was to imagine that the object would have continued to move at the same speed and to indicate by pressing a key when it would have reached the outer line of the right interval (prediction-motion paradigm). We found that the mean estimated TTC was significantly longer when the right interval was filled as compared to empty, regardless of the filling of the left interval. This effect was robust across the variations of interval length and object speed. Thus, consistent with the OKI, there is a clear effect of distance perception on TTC estimation. At the same time, our results show that the perceived speed of the visible, moving object remained unaffected by the filling of the left interval.

**Keywords:** Oppel-Kundt illusion, geometrical-optical illusions, time-to collision estimation, prediction-motion paradigm

**Presentation type:** Poster Presentation

---

## The meaning of acoustic landmarks for human wayfinding: A comparison of physical and mentally imagined acoustic landmarks

Sabrina Vormittag \*, Mira Schwarz , Kai Hamburger

*Experimental Psychology and Cognitive Science, Department of Psychology, Justus Liebig University*

Recent research highlights the role of sensory landmarks in human wayfinding. Given the predominant focus on the visual system in previous studies, we investigated the possibility of auditory landmarks in form of physical as well as mentally imagined auditory landmarks. In an online experiment, 121 participants (82 female, 38 male; mean age: 31.33 years,  $SD = 14.61$  years) were guided through a 15-intersection maze, where they were presented with landmarks accompanied by directional indicators (e.g., arrow pointing left). In the condition with physically presented auditory landmarks, animal sounds were presented as stimuli (e.g., barking dog), while participants in the mentally imagined auditory landmark condition received written instructions to imagine the specific animal sounds. After this learning phase, participants' task in the wayfinding phase was to accurately recall the route with the previously learned associations between landmarks and

directional indicators given at each intersection. In a subsequent recognition phase, participants were presented with either 30 auditory cues or the instruction for mental imagination (15 landmarks from the learning phase and 15 distractors). They were then asked to indicate whether each cue had been presented before. Results demonstrate that it is possible to navigate using physical and mentally imagined auditory landmarks. Participants even achieved a higher orientation performance when auditory landmarks had to be imagined compared to physically presented auditory landmarks. This suggests that the use of mentally imagined auditory landmarks can be an effective method for orientation and may even be more efficient than relying on physically presented auditory landmarks.

**Keywords:** wayfinding, landmarks, acoustic stimuli, mental imagery

**Presentation type:** Poster Presentation

---

## Measuring Inhibition Using Evidence Accumulation Models

Jiashun Wang \*, Christopher Donkin

*Department of Psychology, LMU Munich*

In cognitive psychology, understanding the role of inhibition is crucial for explaining how individuals resolve conflict and make decisions. The Leaky Competing Accumulators (LCA), a widely used model within the evidence accumulation framework, posits that inhibition plays a vital role between two leaky accumulators. However, previous attempts to simultaneously recover both leakage and mutual inhibition parameters have proven challenging. Given the ongoing debate regarding the role of leakage in cognitive processes, this study investigates the recoverability of inhibition after removing the leakage parameter from the LCA, resulting in the Competing Accumulators (CA) model.

We use Mixed Neural Likelihood Estimation (MNLE) to fit the CA model to reaction time (RT) and choice data, obtaining Maximum A Posteriori (MAP) estimates of the model parameters. Our results demonstrate that inhibition can be effectively recovered for CA, which provides accurate predictions for behavioral data in both brightness detection tasks (2AFT and 4AFT) and conflict tasks. Notably, in conflict tasks, the data show that evidence in the congruent condition is stronger than in the incongruent condition, with active inhibition exerted by controlled processes on automatic processes in the incongruent condition. This work advances our understanding of decision-making processes, particularly the quantification of cognitive inhibition, and has important implications for future research in cognitive psychometrics.

**Presentation type:** Poster Presentation

## Prediction in action binding

Xin Wang <sup>1\*</sup>, Shitao Chen <sup>1</sup>, Keyang Wang <sup>1</sup>, Liyu Cao <sup>1,2</sup>

<sup>1</sup> *Department of Psychology and Behavioural Sciences, Zhejiang University, Hangzhou, China,* <sup>2</sup>

*The State Key Lab of Brain-Machine Intelligence, Zhejiang University, Hangzhou, China*

Actions are typically accompanied by sensory feedback (or action-effects). Action-effects, in turn, influence the action. Theoretical accounts of action control assume a pre-activation of action-effects prior to the action execution. However, direct evidence for the pre-activation is scarce. The current study includes three behavior experiments and one EEG experiment. In behavior experiments, a clock with a fast-rotating clock hand was presented while the participants made a voluntary keypress. The task was to report the keypress time by giving the clock hand position when the keypress was made. In the EEG experiment, participants made a keypress when the clock hand was right at the 12 o'clock position while watching two flickering stimuli. Results indicate that in the presence of a predictable action-effect (i.e. a 250-ms delayed sound), the distribution of visuospatial attention around the clock was shifted towards the clock hand position of action-effect onset, thus demonstrating an influence of action-effects on an action-related task. No attention shift was observed after action execution, however. Importantly, we could show that the attention shift caused by the action-effect occurred already at about 1 second before the action execution, which was further preceded and predicted by a lateralisation of alpha oscillations in the parieto-occipital area from about 1.8 seconds before the action execution. Therefore, our results indicate a very early pre-activation of action-effect during a voluntary action. The neural implementation of the action-effect pre-activation was achieved through alpha lateralisation, as the spatial location was the key feature of action-effects in the current study.

**Keywords:** action control, prediction, event-file, alpha oscillations, temporal binding

**Presentation type:** Poster Presentation



## **CIEYEmate Change – How Climate Anxiety Affects Attentional Control in Anti-Saccades away from Climate Change Consequences**

Melina Wappes \*, Mascha E. Gross , Laura Meyer , Finja Orth , Deborah Werner , Christina U.

Pfeuffer

*Catholic University of Eichstätt-Ingolstadt*

The anti-saccade task is a prominent measure of cognitive/attentional control, specifically prepotent response inhibition, which is assessed via the anti-saccade effect (ASE). That is, increased saccade latencies and saccadic error rates are observed when participants are instructed to perform eye movements away from appearing stimuli (anti-saccade) rather than towards appearing stimuli (pro-saccade). Prior studies showed that emotional stimuli modulate attention allocation in anti-saccade tasks by influencing inhibitory control. Here, we examined to what degree images of climate change consequences elicit attentional anti-saccade patterns similar to those triggered by negative emotional stimuli. To this end, we systematically compared ASEs in saccade latencies and error rates across three image categories: climate change, neutral, and negative images. Importantly, we further investigated whether individual climate anxiety and environmental attitudes influenced ASEs for climate change images but not negative images. In line with our hypotheses, we observed that ASEs for climate change images increased compared to neutral images with increasing individual climate anxiety scores, showing that individual anxiety levels modulate inhibitory control based on emotional stimuli. Importantly, however, the impact of climate anxiety on ASEs was not specific to climate change images, but also occurred (to a lesser degree) for negative images. These findings suggest that climate change images are perceived as emotionally-negative and are capable of influencing attentional mechanisms, potentially due to their association with anxiety-provoking content. This supports the idea that individual emotional and cognitive states, such as climate anxiety, can impact on how we attend to climate change consequences.

**Keywords:** anti-saccades, cognitive control, attention, climate change, climate anxiety, emotional stimuli

**Presentation type:** Poster Presentation

## **Evaluative Conditioning with Multiple Unconditioned Stimuli – Integration at Learning or at Judgment?**

Florian Weber <sup>1\*</sup>, Hans Alves <sup>1</sup>, Tobias Vogel <sup>2</sup>, Moritz Ingendahl <sup>1</sup>

<sup>1</sup> *Department of Psychology, Ruhr University Bochum*, <sup>2</sup> *Department of Social Sciences, Darmstadt University of Applied Sciences*

Evaluative conditioning (EC) is the change in an attitude towards a conditioned stimulus (CS) due to the pairing of said CS with a positive or negative unconditioned stimulus (US). Recent research investigated how pairings of a CS with multiple USs simultaneously affect CS attitude change, suggesting that conditioned attitudes result from the weighted averaging of affective US information. The present study expands this previous work from a cognitive perspective, investigating whether US information is integrated during the learning or the judgment stage of the conditioning process. A study design was employed in which the CS was simultaneously paired with a positive/negative and a second neutral US. After this conditioning phase, the valence of the neutral US was changed. We find that CS attitude changes in accordance with the valence change of the formerly neutral US, leading to the conclusion that US valence information is integrated at the judgment stage of the EC process.

**Keywords:** evaluative conditioning, attitudes, memory, evaluation, information integration

**Presentation type:** Poster Presentation

---

## **Do we feel worse after solving problems with cognitive tools rather than on our own?**

Patrick Weis <sup>\*</sup>, Larissa Lenk , Johannes Bernau , Wilfried Kunde

*Julius-Maximilians University Würzburg*

Previous research suggests that solving a problem comes with positive affect. Is positive affect also induced if we solve problems with the help of cognitive tools? We first demonstrate that affective priming, an easy to apply behavior-based paradigm, can capture positive affect of own problem solving. This validates previous research which had revealed such affect by means of subtle changes of face muscle activity. We then used affective priming to investigate differences between problem solving with and without cognitive tools for two different tasks: rotation and alphanumeric

tasks. In the rotation task, participants had to indicate whether a left shape can be rotated so that it matches a right shape. In the alphanumeric task, participants had to indicate whether counting up the alphabet starting from a left letter results in the right letter (e.g., A + 3 = D is correct). Results suggest that solving problems with cognitive tools is indeed associated with less positive affect than without, but only for alphanumeric problems. We suggest that the nature of tools might cause this disparity. The tool used for rotation was engaging because it allowed to continuously rotate a stimulus on screen to inform the answer. Contrarily, the tool used for alphanumeric equations only allowed participants to access the correct answer (e.g., only showing “D” in the example above). Further directions of researching the affective consequences of cognitive tool use are being discussed.

**Keywords:** Cognitive offloading; problem solving; affect

**Presentation type:** Poster Presentation

---

## **Proactive interference from a previous task context increases the cost of switching between non-competitive tasks**

Mike Wendt <sup>1\*</sup>, Miriam Gade <sup>2</sup>

<sup>1</sup> Medical School Hamburg, <sup>2</sup> Medical School Berlin

Switching between tasks afforded by the same stimuli is associated with a slow-down in responding. This task switch cost is assumed to result, to some extent, from proactive interference evoked by previous processing of the current stimulus in the context of the other task, suggesting more pronounced susceptibility to proactive interference in task switch trials than in task repetition trials. To investigate whether this switch-specific enhancement of proactive interference is confined to competition from the other task of the current task context or whether it represents a more general property of task-switching performance, participants switched between a color task and a letter task featuring single-affordant stimuli (i.e., stimuli that did not allow application of the other task). Proactive interference was evoked by reversing the stimulus-response assignment in one of the tasks after the first half of the experimental session. Consistent with the notion of stronger susceptibility to proactive interference in switching conditions, this manipulation enhanced the switch cost in the task subject to the mapping reversal. Increasing task preparation by lengthening the cue-target interval from 200 ms to 800 ms did not reduce the reversal-induced enhancement of the task switch cost in reaction times (despite reducing the task switch cost overall). Our results

suggest that switching between tasks—even in the absence of competition between them—increases susceptibility to proactive interference despite ample task preparation.

**Keywords:** task switching, proactive interference, preparation

**Presentation type:** Poster Presentation

---

## **Illusions of Control: Instructed Goal Focus Matters**

Dorit Wenke <sup>1\*</sup>, Karoline Karsten <sup>1</sup>, Mariam Katsarava <sup>2</sup>, Robert Gaschler <sup>2</sup>

<sup>1</sup> *PFH Private University of Applied Sciences*, <sup>2</sup> *FernUniversität in Hagen*

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. In our study we investigated whether the size of the density bias depends on instructed goal focus. To this end, we either instructed participants to remove an aversive stimulus (negative reinforcement condition) or to produce an appetitive stimulus (positive reinforcement condition) in a setting that was otherwise identical: for all participants an aversive stimulus stopped and was replaced by a positive stimulus either frequently or rarely, independent of action, whereas the aversive stimulus continued in the remaining trials. First results indicate a more pronounced sense of control in the negative than in the positive reinforcement condition, suggesting that negative reinforcement may be particularly effective in fostering superstitious behaviors.

**Keywords:** illusions of control, sense of agency, Instruction, learning, reinforcement, goal focus

**Presentation type:** Poster Presentation

## **Comparing Self-Descriptiveness and Autobiographical Memory Tasks in the Self-Reference Effect Across Age Groups**

Lisa Wenzel \*, Daniel Zimprich

*Ulm University*

The self-reference effect is a well-established cognitive phenomenon in which individuals tend to remember information more effectively when it is processed in relation to themselves. Studies examining its relationship with aging have produced suggest that the self-reference effect remains robust in older adults. However, already Klein, Loftus, and Burton (1989) noted that the self-reference effect can be elicited through two distinct methods: (1) evaluating trait adjectives for self-descriptiveness and (2) retrieving autobiographical memories tied to a stimulus word. Upon reviewing existing literature, we noticed that previous research comparing the self-reference effect across age groups has predominantly utilized the self-descriptiveness task, leaving the potential impact of autobiographical memory tasks unexplored.

In this study, we sought to investigate how the self-reference effect in memory operates across age groups when using both types of manipulations. Specifically, we hypothesized that an autobiographically-laden task might give older adults a specific advantage due to their richer autobiographical knowledge base. To test this hypothesis, we conducted an experiment with 90 participants, including both younger and older adults, who were exposed to both the self-descriptiveness task and the autobiographical memory task. Our results revealed that the autobiographical task resulted in a memory advantage for older adults compared to the self-descriptiveness task. Furthermore, the age-related differences in memory performance were notably smaller in the autobiographical condition compared to the self-descriptiveness condition.

**Keywords:** Aging, Self-Reference Effect, Autobiographical Memories

**Presentation type:** Poster Presentation

## **The special role of verbal labels in concept formation: Comparing the facilitating effects of verbal and nonverbal labels**

Juliane Werner <sup>\*</sup>, Selina Braun , Keno Schaumburg , Karoline Bading , Barbara Kaup

*University of Tübingen*

Non-informative verbal labels can facilitate concept formation when compared to a situation in which no labels are present. Importantly, non-informative nonverbal labels (like movements) do not facilitate concept formation in the same way (Lupyan et al., 2007). Using a different stimulus set, we attempted to conceptually replicate this verbal-label effect. In a training phase, we compared a verbal-label, a nonverbal-label and a no-label group regarding their performance in categorizing two types of fish. All groups received auditory feedback after their categorization response. In addition, the verbal-label group received a written pseudo word for each of the two categories, while the nonverbal-label group saw a specific movement instead of a verbal label. The no-label group received no additional information. In a later test phase, categorization was investigated without feedback or labels. During training, the verbal-label group outperformed the no-label group. At the end of training, this group also outperformed the nonverbal-label group. In the subsequent test phase, however, there was only a tendency towards an advantage of the verbal-label group. Although we could not fully replicate the results by Lupyan et al. (2007), this study provides clear evidence towards a special role of verbal labels during concept formation.

Lupyan, G., et al. (2007). Language is not just for talking: Redundant labels facilitate learning of novel categories. *Psychological Science*, 18(12), 1077–1083.

**Keywords:** verbal labels, nonverbal labels, categorization, concept formation

**Presentation type:** Poster Presentation

## Impaired and Biased Emotional Judgement of Faces with Masks: a Re-Analysis

Martina Wernicke \*, Kristian Folta-Schoofs

*Neurodidactics & NeuroLab, Institute of Psychology, University of Hildesheim, Germany*

Wearing face masks during an infection gained popularity during the COVID-19 pandemic. Carbon (2020) examined effects of masks on facial emotion perception and revealed reduced accuracy and confidence in a forced-choice task with six expressions (angry, disgusted, fearful, happy, neutral, sad). Our data ( $N = 195$ ) was originally gathered to assess the role of maladaptive relationship styles that lead to reduced accuracy, increased perceived intensity and decreased reaction times without affecting confidence. The current re-analysis aims to replicate and expand the findings of Carbon (2020). In contrast to the original study, we restricted the viewing time to 500ms, omitted the option “neutral” and included an estimation of intensity to increase compatibility between trials and render the task demand more realistic. In line with Carbon (2020), subjects were more prone to errors and less confident in their judgement of masked faces. Masked expressions were also perceived as less intense which is in line with an increased tendency to choose “neutral” in the previous study. However, the current data suggests that this effect might be restricted to disgusted, happy and sad faces. Furthermore, our data indicates that neutral faces are generally prone to be perceived as sad (50.26%) and that masked neutral faces are less likely to be seen as angry but more likely to be seen fearful or happy. While rendering the assessment of emotions more difficult, masks might also contribute to a more defensive judgment with potential benefits for social interactions.

C. C. Carbon, *Front. Psychol.* 11:566886 (2020)

**Keywords:** emotion, face perception, face masks, pandemic, accuracy, perception bias

**Presentation type:** Poster Presentation

## Concreteness is inherent to human and language model word meaning

Emily Wiebers <sup>1\*</sup>, Cosimo Iaia <sup>1</sup>, Bhavin Choksi <sup>2</sup>, Gemma Roig <sup>2,3,4</sup>, Christian Fiebach <sup>1,5</sup>

<sup>1</sup> *Department for Psychology, Goethe University Frankfurt, Frankfurt am Main, Germany,* <sup>2</sup>

*Department for Computer Science, Goethe University Frankfurt, Frankfurt am Main, Germany,* <sup>3</sup>

*Center for Brains, Minds and Machines, MIT,* <sup>4</sup> *Hessian.AI,* <sup>5</sup> *Brain Imaging Center, Goethe*

*University Frankfurt, Frankfurt am Main, Germany*

Understanding how concreteness shapes semantic representations and is processed is a central question in cognitive science, neuroscience, and computational linguistics. However, it still remains unclear how concrete and abstract words are represented in the semantic system. To address this, we implemented a semantic task that does not explicitly focus attention on our variable of interest (concreteness), i.e., an odd-one-out task. A sample of native German speakers (N = 40) were presented with 9880 word triplets and instructed to identify the word least similar to the others within each triplet. Orthogonally to concreteness, we varied word frequency and controlled for length and Orthographic Levenshtein distance 20 (OLD20). We derived a Representational Dissimilarity Matrix (RDM) from participants' ratings, reflecting subjective pairwise semantic relationships, and compared it to an RDM derived from pairwise cosine distances of word vectors from \textit{fastText}. We hypothesized that concrete and abstract words would elicit different selection patterns, reflecting distinct underlying semantic representations. Prediction of the human data by the distributional semantic model (DSM) significantly improves when incorporating concreteness as predictor, compared to control variables such as word frequency, word length, and OLD20. Our findings suggest that concreteness, unlike word frequency, is implicitly employed by humans and language model(s) in representing the similarity structure of word meaning. This supports the view that concreteness is an intrinsic property of word meaning, deeply embedded in semantic representations, both biological and artificial.

**Keywords:** concreteness, semantic space, language model, odd-one-out

**Presentation type:** Poster Presentation



## **Sequential and Simultaneous Contingency Learning: Same or Different? Integrating the Serial Response Time Task, Artificial Grammar Learning, Evaluative Conditioning, and the Flanker Task into a Single Paradigm**

Sarah Wilts \*, Emilia Ehritt , Hilde Haider , Christoph Stahl

*University of Cologne*

Models of contingency learning, particularly implicit learning, propose that implicit and explicit learning mechanisms rely either on a single system or on multiple systems. These models further examine how task characteristics, such as the temporal order and attentional relevance of contingent stimuli, shape learning. This study explores whether four learning paradigms can be integrated into a unified framework, considering the effects of temporal order and attention. Temporal order was varied by presenting contingencies either simultaneous within a trial, as in the flanker task and evaluative conditioning, or sequential between trials as in the serial response time task and artificial grammar learning. Attention was manipulated by using contingencies that were either more response-relevant, as in the flanker task and serial response time task, or more response-irrelevant, as in evaluative conditioning and artificial grammar learning. This 2x2 research design combines four commonly used learning paradigms, enabling a systematic evaluation of temporal and attentional influences on (implicit) learning. Preliminary findings reveal differential effects of these factors across paradigms: Artificial grammar learning occurred regardless of temporal or attentional task demands, whereas evaluative conditioning and the flanker task required focused attention on the simultaneous contingency presentation to produce learning effects.

**Keywords:** implicit learning, serial response time task, artificial grammar learning, evaluative conditioning, flanker task

**Presentation type:** Poster Presentation

## Behind the Scenes of Lying – A Behavioral Insight into Cognitive and Emotional Processes

Tabea Wächtershäuser \*, Kristina Suchotzki

*Philipps-University of Marburg*

While substantial research has explored the cognitive processes underlying deception (e.g., Vrij et al., 2008, Suchotzki et al., 2015), emotional processes remain largely unclear. This study aimed to disentangle the cognitive and emotional mechanisms involved in lying through a simultaneous investigation of both factors. We used an adapted version of the Sheffield Lie Test (Spence et al., 2001), in which participants (n=49) responded truthfully or deceptively to either neutral or mock crime-related questions, depending on block-specific instructions. After each block, participants rated how cognitively and emotionally demanding they experienced responding in the respective block. In line with our hypotheses, deceptive responses led to significantly longer reaction times and higher perceived cognitive and emotional load compared to truthful responses. Responses to mock crime-related questions also led to longer reaction times and higher perceived cognitive and emotional load than responses to neutral questions. Contrary to expectations, there was no significant interaction between question type and response instruction. Further analyses identified a range of specific cognitive (e.g., response inhibition, strategy selection) and emotional (e.g., nervousness, fear) processes that were more pronounced during deception than during truth-telling, collectively contributing to the increase in reaction time during deception. These findings underscore the essential role of both cognitive and emotional processes in deception and provide insights into the further specification of these processes.

**Keywords:** deception, lying, cognitive processes, emotional processes, reaction times, Sheffield Lie Test

**Presentation type:** Poster Presentation

## **Estimating camera position in camera-monitor systems: Effects of horizontal displacement and reference visibility**

Elisabeth Wögerbauer <sup>\*</sup>, Heiko Hecht

*Johannes Gutenberg-University Mainz*

Camera-monitor systems (CMS) are increasingly replacing traditional side mirrors in vehicles, allowing for flexible camera placement. The latter usually does not correspond to the virtual eye-point provided by conventional mirror positions. While such placements can offer practical advantages, they may also challenge the drivers' ability to perceive spatial and perspective-related information. Our research shows that a horizontal displacement of the camera – either forward or backward along the vehicle – does not significantly affect performance in a time-to-contact (TTC) estimation task, whereas the visibility of a reference (such as a part of the own vehicle) significantly reduces estimation errors. Building on these findings, we also investigate how a horizontal displacement of the camera influences drivers' ability to deduce the camera position from the perspective shown in the monitor, particularly when no reference is visible. Implications for the design of camera-monitor systems will be discussed.

**Presentation type:** Poster Presentation

---

## **Decoding Voice Identity in Auditory Working Memory: an MEG Study**

Melek Öyküm Yalçın <sup>1, 2\*</sup>, Cora Fischer <sup>1, 2</sup>, Philipp Deutsch <sup>1, 2</sup>, Pascal Belin <sup>3</sup>, Christoph Bledowski <sup>1, 2</sup>, Jochen Kaiser <sup>1, 2</sup>

<sup>1</sup> *Institute of Medical Psychology, Medical Faculty, Goethe University, Frankfurt am Main 60528, Germany*, <sup>2</sup> *Cooperative Brain Imaging Center, Medical Faculty, Goethe University, Frankfurt am Main, 60528, Germany*, <sup>3</sup> *Aix-Marseille Université, CNRS, INT, Institut de Neurosciences de la Timone, Faculty of Medicine, 27, Boulevard Jean Moulin, Marseille, 13005, France*

Auditory working memory (AWM) is critical for the temporary maintenance of sensory information, particularly in real-world communication contexts. Despite extensive research on visual working memory, the encoding of auditory features in working memory and their neural representation have remained less explored. As previous work has suggested that sounds are stored in working memory as objects including both task-relevant and -irrelevant features, we investigated whether we can decode both types of features from magnetoencephalography (MEG) signals. We conducted an experiment using a delayed match-to-sample task. Stimuli were spoken syllables that differed both

in perceived spatial location and voice identity (i.e., specific combinations of timbre and pitch). Participants were instructed to memorize voice identity (the relevant feature), while location (the irrelevant feature) could be ignored. The task required a match non-match decision about a probe sound whose irrelevant feature value could either be identical to or differ from the memorized stimulus. Behavioral results demonstrated that voice identity matches were detected more accurately and faster when the irrelevant location matched the probe as well, whereas for voice identity non-match trials, there was no effect of the irrelevant feature. Multi-variate pattern analyses revealed that both task-relevant and -irrelevant features were decodable during the encoding phase. While the task-relevant voice identity yielded higher classification performance compared to location, location information was decodable earlier than voice identity. In conclusion, both our behavioral and MEG data suggest that location information is encoded alongside voice identity, and task relevance modulates the decodability of auditory features.

**Keywords:** Auditory working memory, Decoding, MEG, Task relevance

**Presentation type:** Poster Presentation

---

## **Asymmetric control adaptation: Testing a within-subject asymmetric list-shift effect with a confound-minimized face-name Stroop task**

Shu Yang <sup>1\*</sup>, Gesine Dreisbach <sup>2</sup>, Rico Fischer <sup>1</sup>

<sup>1</sup> *University of Greifswald*, <sup>2</sup> *Regensburg University*

The list-wide proportion congruency (LWPC) effect refers to larger congruency effects in blocks with mostly congruent (MC) trials compared to blocks with mostly incongruent (MI) trials. The asymmetrical list shift (ALS) effect describes the observation that congruency effects decrease significantly during MC-to-MI transitions but show little increase during MI-to-MC transitions. This asymmetry has been attributed to rapid recruitment of shielding during MC-to-MI transitions and persistent shielding during MI-to-MC transitions.

This study aimed to replicate the ALS effect using a confound-minimized face-name Stroop task. Participants learned the names of six faces and responded to faces while ignoring the names. Four face-name pairs were conflict-frequency biased, forming MC (80% congruent) and MI (80% incongruent) blocks. Two face-name pairs were unbiased (50% congruency) to assess the transferability of the ALS effect. All participants performed the MC-to-MI and MI-to-MC transition and both transitions included different sets of face-name pairs.

Overall, results revealed both LWPC and ALS effects for biased and unbiased items. Crucially, ALS effects in unbiased items, which were practiced equally in MC and MI blocks, support the assumption of asymmetric control adaptation. Notably, an ALS effect for unbiased items was only observed in participants starting with MC-to-MI transitions, suggesting that the first encounter with a conflict-frequency biased block influences subsequent adaptability.

**Keywords:** cognitive control, control adaptation, proportion congruency, asymmetrical list shift (ALS) effect, face-name Stroop

**Presentation type:** Poster Presentation

---

## A psychometrics of individual differences in the truth effect

Selina Zajdler \*, Martin Schnuerch

*University of Mannheim*

The illusory truth effect describes the effect of repetition on judgments of truth, where previously encountered statements are judged to be more valid than new statements. One line of research has focused on individual differences in this effect: Examining how the truth effect covaries with dispositional variables allows researchers to infer underlying mechanisms and, ultimately, to design interventions against the effect. However, findings regarding individual differences have been inconsistent: While some studies find correlations with certain dispositional variables, others do not. We argue that these ambiguities may be due to poor psychometric properties of truth effect experiments. Specifically, correlations may be attenuated by low reliability, so that some correlations may not even be recoverable. Therefore, in a large-scale reanalysis of multiple published data sets, we assess the psychometric goodness of truth effect experiments using a signal-to-noise ratio introduced by Rouder et al. (2023) that quantifies task goodness independent of trial size. Our analysis shows that individual truth effect scores typically have low reliability, potentially masking true correlations with other variables. We identify experimental characteristics that promote reliability, such as stimulus material, initial task conditions, sample composition, and study implementation (online vs. lab). Our findings provide guidance for more reliable study designs when investigating individual differences in the truth effect and demonstrate that achieving high reliability is feasible. This work thus provides the basis for robust research on individual differences in the truth effect.

**Keywords:** truth effect, truth judgments, individual differences, reliability, experimental design

**Presentation type:** Poster Presentation

---

## Event Segmentation Distorts Subjective Time Perception Across Hierarchical Levels

Qiyuan Zeng <sup>1\*</sup>, Darinka Trübutschek <sup>1</sup>, Lucia Melloni <sup>1, 2, 3</sup>

<sup>1</sup> *Research Group Neural Circuits, Consciousness, and Cognition, Max Planck Institute for Empirical Aesthetics, Frankfurt am Main, Germany*, <sup>2</sup> *Department of Neurology, New York University Grossman School of Medicine, New York, US*, <sup>3</sup> *Predictive Brain Department, Research Center One Health Ruhr, University Alliance Ruhr, Psychology Faculty, Ruhr-Universität Bochum, Bochum, Germany*

A continuous stream of sensory information reaches our senses, yet we perceive discrete, meaningful chunks. In language, for example, we perceive words, phrases, and sentences even though no physical signals mark their boundaries. How are these boundaries formed, and how do they influence subjective perception?

One possible consequence of segmentation is the distortion of subjective time perception. Familiar languages may feel slower, while unfamiliar ones often seem faster. Research suggests that crossing event boundaries can compress or stretch time perception, but the exact nature of this distortion and its interaction with hierarchical segmentation levels—such as syllables, part-words, and words—remain unclear.

To address these questions, we combined a statistical learning (SL) task with a pause adjustment (PA) task. In the PA task, participants adjusted pauses between syllables in structured and random streams until all pauses were perceived as equal in length, minimizing memory biases.

Results showed significantly greater pause distortions in structured streams compared to random streams. Within structured streams, distortions were larger for low transition probability (TP) pairs than for high TP pairs. Linear regression analysis revealed a significant correlation between distortion differences in TP pairs during the PA task and reaction time differences in the SL task, suggesting a link between segmentation ability and time perception distortion.

These findings demonstrate that event segmentation distorts subjective time perception and highlight how this distortion varies across hierarchical levels of segmentation.

**Keywords:** Statistical learning, Time perception, Event segmentation

**Presentation type:** Poster Presentation

## The Generation of Social False Memories and Its Underlying Neural Mechanisms

Huan Zhang <sup>1, 2\*</sup>, Xiquan Qin <sup>1</sup>, Chunming Lu <sup>3</sup>, Ullrich Wagner <sup>2</sup>, Gerald Echterhoff <sup>2</sup>

<sup>1</sup> Faculty of Psychology, Tianjin Normal University, <sup>2</sup> Department of Psychology, University of Muenster, <sup>3</sup> State Key Laboratory of Cognitive Neuroscience and Learning, IDG/McGovern Institute for Brain Research, Beijing Normal University

False memories—recollections of events that never occurred or facts not grounded in reality—pose significant challenges in human life. While previous research has primarily focused on individual false memory tasks, this study aims to investigate the cognitive and neural mechanisms underlying the generation of false memories in a social context. Additionally, we explored the influence of sensory modalities during encoding on social false memories, specifically comparing auditory-encoding with visual-encoding conditions. Behavioral results indicated a significant main effect of item type, with individuals exhibiting more false memories for partner-relevant critical lures compared to irrelevant items, confirming the phenomenon of social false memories. The main effects of sensory channels during encoding were marginally significant, with the auditory-encoding condition showing more false memories than the visual-encoding condition. More importantly, for partner-relevant items, the auditory-encoding condition produced significantly more false memories than the visual-encoding condition; in contrast, for irrelevant items, the auditory-encoding condition did not show a significant difference from the visual-encoding condition. Neuroimaging data revealed that encoding partner-relevant items resulted in a notable decrease in inhibitory brain activity in the auditory-encoding condition compared to the visual-encoding condition and heightened activation in semantic regions. Critically, the intensity of neural activity in these areas serves as a predictive marker for the likelihood of subsequent social false memories. This study investigated the collaborative nature of false memories, shedding light on the interplay between shared attention, sensory modalities, and neural activity in their formation, thereby advancing our understanding of social false memories in context.

**Keywords:** social false memories, social DRM, modality effect, fNIRS

**Presentation type:** Poster Presentation

## **Aging on the Move - "Stop Walking when Talking" as an Extreme Compensatory Strategy against Cognitive-Motor Interference**

Tian Zhou <sup>1\*</sup>, Elisa Straub <sup>1</sup>, Andrea Kiesel <sup>1</sup>, Dominic Gehring <sup>1</sup>, Urs Granacher <sup>1</sup>, Aaron Haslbauer <sup>2</sup>, Reto W. Kressig <sup>2,3</sup>, Roland Rössler <sup>2,3</sup>

<sup>1</sup> *University of Freiburg*, <sup>2</sup> *University Department of Geriatric Medicine Felix Platter*, <sup>3</sup> *University of Basel*

With increasing challenges in walking and the unaffordable consequences of balance loss, older adults have fewer available cognitive resources to allocate to additional tasks. Consequently, they are more likely to prioritize postural control during cognitive-motor dual-tasking. The phenomenon of "Stops Walking When Talking" has been identified as an extreme compensatory strategy to manage cognitive-motor interference and reduce the risk of falls. This phenomenon has been proven as a strong predictor of falls in older adults. Building on the paradigm and findings from Theill et al. (2011), we conducted a retrospective study analyzing data from over 2,500 older adults. We compared single-task performance in cognitive tasks (e.g., animal naming or backward counting) and a motor task (walking approximately 10 meters) with dual-task performance when participants simultaneously walked and performed one of the cognitive tasks. Our analysis replicated significant declines in performance (walking speed, number of correct animal names, and correct numbers counted) under dual-task conditions compared to single-task conditions. Interestingly, dual-tasking was found to be particularly costly for older adults who exhibited "Stops Walking When Talking" behavior but did not report a fear of falling. With additional data collected subsequently, we aim to expand on these findings by employing advanced statistical models to further quantify the extent of dual-task costs and their predictive value for "Stops Walking When Talking" behavior and fall risk in older adults.

**Keywords:** cognitive-motor interference, cognitive aging, cognitive and motor control

**Presentation type:** Poster Presentation



## The role of eye movements in the temporal binding effect

Ran Zhuang <sup>1\*</sup>, Liyu Cao <sup>1, 2</sup>

<sup>1</sup> *Department of Psychology and Behavioral Sciences, Zhejiang University*, <sup>2</sup> *The State Key Lab of Brain-Machine Intelligence, Zhejiang University*

Temporal binding refers to the perceived temporal compression between an action and its delayed sensory outcome. The Libet clock is the most widely used method for measuring the effect. In this method, participants watched a clock with a rapid rotating clock hand. The time of the event of interest was reported as the clock hand position when the event occurred. In the present study, we evaluated the role of eye movements in the time reports obtained with the Libet clock. We conducted a 2 (with eye movement control vs. without eye movement control) × 2 (action-sound vs. sound-only) within-subjects experiment. The task was to report the onset time of a sound. In the action-sound condition, the sound was triggered by a keypress of the participants with a 250 ms delay. In the sound-only condition, the sound was controlled by the computer. The reported sound onset time was earlier in the action-sound condition than in the sound-only condition ( $p < 0.05$ ), thus replicating the temporal binding effect. However, when the eye movements of participants were strictly controlled during the experiment (i.e. no eye movements were allowed), the temporal binding effect was smaller than when there was no eye movement control ( $p < 0.05$ ). Further data analysis showed that the eye movement control influenced the time reporting in the action-sound condition, but not the sound-only condition. Our results suggest that eye movements play an important role in the measurement of temporal binding, possibly due to an influence of visuospatial attention.

**Keywords:** Attention; Temporal binding; Eye movements

**Presentation type:** Poster Presentation

## Early visual areas store information about feature bindings in working memory

Anna Zier <sup>1, 2\*</sup>, Philipp Deutsch <sup>1, 2</sup>, Jochen Kaiser <sup>1, 2</sup>, Christoph Bledowski <sup>1, 2</sup>

<sup>1</sup> *Goethe University, Institute of Medical Psychology, Heinrich-Hoffmann-Str. 9, Haus 88, 60528 Frankfurt am Main, Germany,* <sup>2</sup> *Cooperative Brain Imaging Center (CoBIC), Heinrich-Hoffmann-Str. 9, Haus 88, 60528 Frankfurt am Main, Germany*

Previous studies on the neuronal basis of working memory have identified brain regions that temporarily store simple visual features like motion direction or color. In contrast, it remains unknown which brain areas temporarily store information about how those features are bound into an object.

In each trial of a functional magnetic resonance imaging (fMRI) study, participants (N=20) memorized two objects composed of two visual features each: color and motion direction. We manipulated the feature bindings within these objects across trials. To collect a sufficient number of binding repetitions per participant, each feature varied only across three exemplar categories (color: blue, yellow and pink; motion direction: leftwards, rightwards and downwards). Verbal strategies were minimized by slightly jittering color value and motion direction within each category. Together, this allowed us to isolate memorized binding information by comparing delay-related activity patterns between trials in which participants memorized pairs of objects with exactly the same features but the opposite binding. According to previous research and based on a preliminary analysis (from 10 out of 20 participants), we decoded memory information about motion direction and color from activity in the visual cortex. Crucially, we were also able to decode the trial-specific binding information from the memory-related visual cortex activity.

This novel, but preliminary, finding indicates that early visual areas can retain specific information both about individual features and about the way these features are bound together.

**Keywords:** visual working memory, feature binding, fMRI, MVPA

**Presentation type:** Poster Presentation

## **Reversed SOA effects on distractor-target interference depend on central/peripheral task-relevance**

Ulrike Zimmer \*, Mike Wendt

*ICAN, Department of Psychologie, MSH (Medical School Hamburg), Hamburg, Germany*

In standard flanker tasks, incongruent distractors impair performance more strongly when the flankers are presented shortly in advance of the target. This SOA effect has been ascribed to a “head start” of flanker-related response activation compared to target-related response activation (e.g., Eriksen & Schultz, 1979; Mackenzie et al., 2022). In the current study, we presented both symmetrical letter strings (e.g., HHH, XHX) and asymmetrical letter strings (e.g., HHX, XHH) and asked participants, in separate blocks of trials, to identify the central letter (i.e., flanker task) or to indicate whether the peripheral letters were identical or not (reversing the relationship of central and peripheral letters as targets and distractors compared with the flanker task). Distractors and targets were presented with SOAs of -200 ms, -100 ms, 0 ms, 100 ms, and 200 ms. Our results replicated previous flanker task findings of more pronounced response impairment by incongruent stimuli (i.e., XHX, HXH) when distractor onset preceded target onset than when the SOA was 0 ms. In the same/different task, response impairment by incongruent stimuli was considerably larger than in the flanker task, but appeared to be at maximum when stimuli were presented simultaneously. While the former result is consistent with the notion that centrally presented distractors (i.e., between target stimulus elements) are particularly difficult to ignore, the latter result suggests that distractor-based response activation in the same/different task does depend on a rather simultaneous presentation of all stimulus elements.

**Keywords:** attention, temporal shift, cognitive conflict, flanker, target, same/different, discrimination

**Presentation type:** Poster Presentation

## **The Effects of Disgust, Fear, and Anger on Prospective Memory: Same Valence, Different Effects**

Onur Çalışkan <sup>1, 2\*</sup>, Aycan Kapucu <sup>1</sup>

<sup>1</sup> Ege University, <sup>2</sup> Izmir Bakircay University

In studies investigating the effects of emotions on prospective memory (PM), a valence-based framework is frequently adopted as a general approach. However, specific emotions with the same valence can have distinct effects on memory. The present study examined the effects of anger, fear, and disgust on PM, focusing separately on the intention formation and initiation stages. In the experimental sessions participants watched emotional video clips to induce target emotions before completing a event- based PM task. In the first experiment, emotion induction was conducted before intention formation. The results demonstrated that there was no significant differences in memory accuracy or monitoring. The second experiment examined the effects of anger, fear and disgust on the intention initiation phase. The results indicated no significant differences in prospective memory accuracy; however, disgust resulted in longer reaction times, which were linked to the monitoring-related cost of maintaining the intention. Overall, the present study showed that specific emotions influence prospective memory differently, beyond a valence-based perspective. In particular, disgust increased monitoring during the intention initiation phase compared to fear, anger and neutral emotions. These results were interpreted in terms of the adaptive nature of memory, where its primary role is to store information that is valuable for future scenarios. In this context, disgust may enhance future-oriented information processing and prospective memory more effectively. This study emphasises the importance of investigating how specific emotions effects PM in future studies.

**Keywords:** prospective memory, disgust, fear, anger, specific emotions, discrete emotions

**Presentation type:** Poster Presentation

## Memory sensitivity and response bias for adaptive memory in the context of survival and mate searching for raising offspring.

Yıldız Özkılıç \*

*faculty member*

The survival processing effect (SPE), originally proposed by Narnie (2007), states that words evaluated in the context of survival are better remembered than those evaluated in other contexts. Studies that have identified a memory advantage relative to the reproductive processing effect (RPE) have found a recall advantage in ancestral parenting scenarios involving the rearing of offspring (Seitz et al., 2018).

The aim of this study was to evaluate the impact of different scenarios on response bias and memory accuracy for words using a recognition memory test. In a between-subjects design, 60 participants rated the 40 words on how relevant they were to surviving, mating and raising offspring, and moving to a foreign place. Participants completed a 20-minute delay surprise recognition memory test for old and new words, using a six-point confidence scale. Compared to the other two scenarios, words evaluated in the context of moving elicited a liberal response bias ( $c_a$ ) in all three scenarios. However, the response biases of the words evaluated in the context of survival and mating were not statistically different. The memory sensitivity ( $d_a$ ) of the words evaluated in the context of the three scenarios did not differ significantly from each other.

The results of this study show that the addition of having and raising children to the mate finding context causes a similar response bias for memory as in the survival context, and that memory sensitivity should be examined with different analyses in studies using a recognition memory test.

**Keywords:** Adaptive memory, survival processing, reproductive processing, recognition memory, response bias, sensitivity

**Presentation type:** Poster Presentation

## **Stimulus certainty modulates similarity-induced memory bias**

Nursima Ünver-Aydingül <sup>1, 2, 3\*</sup>, Rosanne Rademaker <sup>1</sup>, Keisuke Fukuda <sup>3</sup>

<sup>1</sup> *Ernst Strüngmann Institute for Neuroscience, Frankfurt, Germany*, <sup>2</sup> *Max Planck-University of Toronto Centre (MPUTC) for Neural Science and Technology, Toronto, Canada*, <sup>3</sup> *University of Toronto, Toronto, Canada*

People often report an item in visual working memory (VWM) as biased towards novel visual input shown during the delay, especially when people consider the novel input to be similar to the memory item. We investigated whether the magnitude of this “similarity-induced memory bias” is influenced by stimulus certainty of the memory item and/or the novel visual input. Across two experiments, participants (N=61) remembered the direction of a dot motion stimulus (memory target) over a 2.5-second delay, subsequently reporting this direction and their confidence. On 80% of trials, novel visual input in the form of a second dot motion stimulus (probe) appeared during the delay, and participants judged its similarity to the target. Stimulus certainty was manipulated by changing the motion coherence of the target and probe. As target coherence decreased, both precision and confidence of the target report decreased, indexing a decline in objective and subjective stimulus certainty. Critically, the similarity-induced memory bias was amplified when the target had low coherence and the probe had high coherence. We discovered that this amplification reflected two dissociable VWM memory errors: bias towards the probe, and replacement of the target by the probe. This implies that working memory contents can be biased or replaced by new input depending on the stimulus certainty.

**Presentation type:** Poster Presentation

## PRE-DATA POSTER

---

### **Representational relevance: A new view on mental representations and prototypicality**

Selma Akarsu <sup>1\*</sup>, Malin Styrnal <sup>1, 2</sup>, Martin Hebart <sup>1, 2, 3</sup>

<sup>1</sup> *Justus Liebig University Giessen*, <sup>2</sup> *Max Planck Institute for Human Cognitive and Brain Sciences, Leipzig*, <sup>3</sup> *Center for Mind, Brain and Behavior, Universities of Marburg, Giessen and Darmstadt*

Objects we encounter in our real world vary in their degree of importance to us. While some are more immediately behaviorally relevant than others, their ultimate relevance is determined by the degree to which they can directly or indirectly affect our cognition and behavior. We term this concept “representational relevance” and propose that it may explain other properties of our semantic knowledge and prototypicality effects that are thought to underlie categorization behavior. This project aims to develop a robust measure of representational relevance that also correlates with established concepts and measures like prototypicality, familiarity, word frequency, age of acquisition, and lexical decision times. To achieve this, we developed a novel 'Family Feud' task in which we ask participants to rank object words by how often they believe other people would spontaneously name them. For example, for the words “lion” and “burrito”, which would be spontaneously named more frequently? The task aims to capture shared cognitive perceptions of representational relevance, thus avoiding naming frequency biases. We expect this measure to offer a deeper understanding of representational relevance as a distinct construct, including its potential overlap with prototypicality and its correlation with existing measures, such as lexical decision times. Finally, we aim to verify the value of this measure by identifying that the strength of cortical representations correlates more strongly with representational relevance than other measures. These findings aim to provide a framework for studying the cognitive processes underlying representational relevance, with potential applications across various domains of psychology and cognitive science.

**Keywords:** Representational relevance, prototypicality, mental representations

**Presentation type:** Pre-Data Poster

## ManyBeds: An international collaboration evaluating the replicability of auditory targeted memory reactivation

Julia Beitner <sup>1, 2, 3\*</sup>, Gordon B. Feld <sup>1, 2, 3, 4</sup>

<sup>1</sup> *Clinical Psychology, Central Institute of Mental Health, Medical Faculty Mannheim, University of Heidelberg, Mannheim, Germany,* <sup>2</sup> *Addiction Behavior and Addiction Medicine, Central Institute of Mental Health, Medical Faculty Mannheim, University of Heidelberg, Mannheim, Germany,* <sup>3</sup> *Psychiatry and Psychotherapy, Central Institute of Mental Health, Medical Faculty Mannheim, University of Heidelberg, Mannheim, Germany,* <sup>4</sup> *Department of Psychology, Ruprecht Karl University of Heidelberg, Heidelberg, Germany*

Targeted memory reactivation (TMR) is a technique that aims to selectively cue and strengthen memories during sleep by presenting associated sensory cues. Rudoy et al. (2009) provided foundational evidence for TMR by demonstrating improved spatial memory performance when auditory cues were replayed during deep sleep. While this finding has significant implications for understanding memory consolidation, the true effect size and useful potential of TMR remain uncertain. The ManyBeds project is a large-scale, multi-lab replication study designed to rigorously test the TMR effect. Across 13 labs from three continents, behavioral and sleep-EEG data from 600 participants will provide a precise estimate of the TMR effect and insights into the robustness and variability of analyses. Using a split-half dataset, the project employs a many-analysts approach where teams preregister their analyses, exchange feedback, and submit reproducible scripts, allowing validation of results on the withheld dataset. ManyBeds further aims to explore contextual factors that influence replication outcomes, such as researcher expectations and analysis choices. ManyBeds not only addresses questions about replicability, robustness, and variability in sleep-dependent memory research but also serves as a model for Big Team Science approaches. This presentation will discuss the study's aims, current progress, and its potential to advance replicability and transparency in cognitive psychology and neuroscience.

Rudoy, J. D., Voss, J. L., Westerberg, C. E., & Paller, K. A. (2009). Strengthening individual memories by reactivating them during sleep. *Science*, 326(5956), 1079.

DOI:10.1126/science.1179013

**Keywords:** targeted memory reactivation, sleep, memory, EEG, open science, big team science, replication

**Presentation type:** Pre-Data Poster



## Can our hands discriminate object sizes better than our eyes?

Kriti Bhatia <sup>1\*</sup>, Tanja Huber <sup>1</sup>, Angela Osenberg <sup>1</sup>, Markus Janczyk <sup>2</sup>, Thomas Schenk <sup>3</sup>, Volker H. Franz <sup>1</sup>

<sup>1</sup> Universität Tübingen, <sup>2</sup> Universität Bremen, <sup>3</sup> Ludwig-Maximilians-Universität München

Ganel et al. (2012, PLoS One) reported that when participants discriminated between two discs (40 and 40.5 mm in diameter), grasping was more accurate than perceptual judgements, thereby suggesting that visual information is differently processed for perception versus action in the ventral versus dorsal cortical streams (Perception-Action Model). The basis for this interpretation was that participants' grip apertures during grasping reflected the true size difference of the discs well, while perceptual judgement accuracy was only 59% (close to chance-level of 50%). However, interpreting such a pattern of results as a difference in accuracy (good accuracy in grasping vs. bad accuracy in perceptual judgement) has been criticized for other experimental paradigms: Meyen et al. (2021, JEP:G) showed that the same underlying information can result in poor classification accuracy, yet show a clear separation of the means (e.g., in grip apertures). Instead, they suggest to dichotomize the continuous measures (grip apertures) using signal detection theory to calculate a corresponding (grasping) classification accuracy. The planned experiment will be an improved replication of Ganel et al. (2012) with n = 36 participants. Further, grasping classification accuracy will be calculated and compared to the perceptual judgement accuracy. Therefore, differences in the ability to discriminate size in grasping versus perception will be directly tested. Additionally, the experiment will also include a manual size estimation task, which is assumed to rely on perceptual representations but has similar task demands as grasping for better comparability.

**Keywords:** action, perception, grasping, manual estimation, perceptual judgement, size perception

**Presentation type:** Pre-Data Poster

## **Impact of activity breaks on physical health and cognitive performance at work: experimental design with a psychophysiological perspective.**

Kim-Aljoscha Bressemer \*, Marion Freyer , Sylvia Jankowiak , Janice Hegewald , Charline Jost

*Federal Institute for Occupational Safety and Health, Unit 3.1 Prevention of Work-related Diseases*

In recent decades, workplace digitalization caused an increase in sedentary work. This trend may further be intensified by the rise of working from home. Sedentary behaviour negatively affects physical health and cognitive performance, and sedentary work may be a contributing factor. Research into short-term activities at work that may promote cognitive performance and information processing remains limited. Additionally, cognitive impairments may not always be recognizable in performance, as individuals often compensate. However, short-term cognitive impairments can be detected using electroencephalography (EEG).

We will adopt a holistic approach to study the effects of sitting interruptions with movement (i.e., walking breaks) on cognitive performance and muscle activity in laboratory tests. The experiment is designed to examine the influence of frequency and duration of the sitting interruptions with movements. Parameters such as objective mental workload, heart rate variability, and muscular tension will be recorded utilizing EEG, electrocardiography, and electromyography. We will also assess subjective mental and physical load with the NASA-TLX and other questionnaires. Realistic work-related cognitive tasks will be simulated, and the perceived interference of sitting interruptions will be assessed by the participants to identify the advantages and disadvantages of sitting interruptions.

Ultimately, we plan to examine dose-response relationships and derive recommendations for taking breaks from sitting that can be practically applied in an office environment. These recommendations may help maintain employability by promoting cognitive performance and health through well-designed work-organisation and work-environments. Future research might evaluate these laboratory findings within the context of longitudinal interventions in company settings.

**Keywords:** Sedentary work, electroencephalography, work breaks, short bouts of activity, cognition

**Presentation type:** Pre-Data Poster

## **Cognitive Mechanisms Underlying the Reduction of Task-Pair Set Activation in Dual-Task Contexts: The Role of Passive Decay Over Time**

Alice Camisa \*, Iring Koch , Patricia Hirsch

*Cognitive and Experimental Psychology, Institute of Psychology, RWTH Aachen University,  
Jägerstr. 17-19, D-52066 Aachen, Germany*

Evidence from task-switching research suggests that task representations passively decay over time, as demonstrated by studies manipulating the response-cue interval (RCI). This time interval does not allow for active preparation of the upcoming task, but provides time for the current representation to decay. As a result, switch costs (worse performance in task switches compared to task repetitions) tend to decrease with increasing RCIs. The present study aims to investigate the temporal dynamics of higher-order cognitive representations in dual-task contexts, where two tasks are jointly represented as a task-pair set. To this end, we will adopt the task-pair switching logic, involving three speeded categorization tasks combined into two task-pairs. Each trial, preceded by a cue, will consist of a task-pair including a constant task 1 (A: tone task), followed by a varying task 2 (B or C: visual tasks). The task-pair sequence will be manipulated on a trial-by-trial basis, resulting in either task-pair switch trials (e.g., AB → AC) or task-pair repetition trials (e.g., AB → AB). We will manipulate both the stimulus-onset asynchrony (SOA: the interval between the onsets of task 1 and task 2 stimuli) and the RCI. Besides a typical effect of SOA, we predict task-pair switch costs in task 1 and task 2 as well as a reduction of these costs with increasing RCIs, as measured by reaction times and error rates. Such findings would suggest that task-pair set activation decays over time, providing new insights into the cognitive mechanisms underlying the reduction of task-pair set activation.

**Keywords:** dual tasks, task-pair switching, task-pair set, response-cue interval, PRP effect, passive decay

**Presentation type:** Pre-Data Poster

## **Tremble-Hide-Run: an Ecological Anxiety Test (THREAT)**

Olivier de Vries \*, Dominik Bach

*Hertz Chair for Artificial Intelligence and Neuroscience, TRA Life and Health, University of Bonn*

Anxiety refers to an emotional state that is typically experienced when an important goal, such as survival or social approval, is under threat. Whereas in some cases it serves a purpose as a negative reinforcer that encourages action to remove the threat, many individuals suffer from disproportional levels of anxiety in their daily lives. Despite decades of scientific efforts, surprisingly little progress has been made towards understanding the behavioral and cognitive mechanisms of anxiety. Two explanations are often given in the current literature. First, the laboratory tasks used in experimental psychopathology may be too simplistic and abstract to probe the mechanisms that underlie anxiety in real life. Second, patient status often hinges on the diagnostic criteria of the Diagnostic and Statistical Manual of Mental Disorders (DSM), which has been much criticized for assuming categorical differences between patients and non-patients, as well as comorbidity being the rule rather than the exception. In short, there are conceptual problems on both sides of the equation when relating clinical anxiety to behavior and cognition in an experimental setting. This study aims to address both these shortcomings. Patients and non-patients will be recruited to participate in complex, naturalistic tasks in virtual reality where they need to take risks to survive under various levels of threat certainty. We will use the 'Hierarchical Taxonomy of Psychopathology' (HiTOP) framework, which has recently been developed to overcome the issues of the DSM framework, to characterize participants along a complete set of orthogonal symptom dimensions and higher-order constructs.

**Keywords:** Anxiety, Uncertainty, Approach/Avoid, Virtual Reality, HiTOP

**Presentation type:** Pre-Data Poster

## Modeling aesthetic experiences across dynamic natural inputs.

Mustafa Alperen Ekinici <sup>1\*</sup>, Daniel Kaiser <sup>1, 2</sup>

<sup>1</sup> *Neural Computation Group, Department of Mathematics and Computer Science, Physics, Geography, Justus Liebig University Gießen, Gießen Germany,* <sup>2</sup> *Center for Mind, Brain and Behavior (CMBB), Philipps-University Marburg, Justus Liebig University Gießen and Technical University Darmstadt, Marburg, Germany*

In daily life, visual aesthetic experiences often arise from sustained exposure to dynamic stimuli. However, we still have a limited understanding of how aesthetic experiences emerge and continuously change in such situations. In this project, we aim to explore how visual information drives aesthetic appeal and which neural mechanisms contribute to this process. We will collect behavioral data while participants watch the documentary “Home” and continuously rate aesthetic appeal. During these experiments, we will also record eye movements and EEG activity. The chosen documentary features a diverse range of visual contents, from the dance of a whale to forest fires, capturing both pleasing and unpleasing scenes from all around the world. This variety mimics the complexity and vastness of real-life experiences. This is a critical advance over previous studies, which mainly used short video clips or static images. By using a long and diverse movie and continuous ratings, we can now study how aesthetic experiences arise and transform over longer timescales. Our project has two objectives. The first objective is to predict continuous aesthetic ratings and their variations between observers from visual features. For this, we will develop a model that predicts aesthetic ratings based on visual features extracted from a deep neural network trained on scene classification. The second objective is to predict the ratings from participants’ eye gaze patterns and EEG responses. Deriving predictions from oscillatory EEG activity will specifically allow us to dissociate the influence of feedforward and feedback information propagation on perceived aesthetic appeal.

**Keywords:** Visual neuroaesthetics, aesthetic appeal, dynamic naturalistic stimuli, continuous rating, eye movements, oscillatory activity, EEG.

**Presentation type:** Pre-Data Poster

## **Choose your own PAS? Modifying the Perceptual Awareness Scale impacts unconscious processing inferences**

Alicia Ferrer-Mendieta \*, Miguel Vadillo , Alicia Franco-Martínez

*Departamento de psicología básica, Universidad Autónoma de Madrid*

The Perceptual Awareness Scale (PAS, Ramsoy & Overgaard, 2004) was created to measure the different degrees of clarity that may be present in subliminal perception. Since then, the PAS has been widely used in consciousness literature. Given that the PAS was presented as a methodological approach (Overgaard & Sandberg, 2021), the original 4-point item and its labels have been modified to accommodate different necessities of the research carried out. However, most modifications lack proper justification or validity evidence to support their use. For instance, Soto et al. (2011) used a PAS version to study whether the working memory could operate with unconscious representations. During the replication of Soto et al.'s study, Franco-Martínez et al. (2024) observed substantial changes in pilot participants' performance when varying the PAS labels and instructions. Our research question is whether modifying the PAS affects the results and inferences in an unconscious processing research. Furthermore, a study comparing the different scales is also needed to assist in the debate about the dichotomous and gradual nature of visual awareness. In this study we will study the validity of different PAS versions observed in the literature –ranging from a dichotomous scale, to a 5-points scale and varying their categories labels. We will perform an experimental design in which each participant will be randomly assigned to one PAS version. Specifically, we intend to test whether the use of one or another PAS would affect the probability of inferring whether the working memory is unconscious or not.

**Keywords:** PAS, Visual awareness, Unconscious processing, Validity, Measures.

**Presentation type:** Pre-Data Poster

---

## **Improving improvement**

Luke Gelagin \*, Chris Donkin

*Ludwig Maximilian University of Munich*

At first brush "mental improvement" is a massively broad topic covering development in everything from social cues to symphony composition. Existing literature normally focuses on development of specific skill, and attempts to be more general are limited by the narrow of range of lab-appropriate

experiments. This projects proposes that a cross-sectional theory-driven analysis of improvement has significant predictive benefits despite the wide range of behaviours being explained. I will show that specific predictions in rate of improvement, speed, accuracy and generalizability follow naturally from considering improvement along two axes: process change and memory recall.

**Keywords:** Improvement, skill development, learning

**Presentation type:** Pre-Data Poster

---

## Development of visual-predictive abilities and motor skills in full-term and preterm infants

Anna Thereza Grab <sup>1\*</sup>, Tharanirakshita Asokan <sup>1, 2</sup>, Gudrun Schwarzer <sup>1, 2</sup>, Bianca Jovanovic <sup>1, 2</sup>

<sup>1</sup> *Department of Developmental Psychology, Justus Liebig University Giessen, Germany,* <sup>2</sup> *Center for Mind, Brain and Behavior (CMBB), University of Marburg, Giessen and Darmstadt, Germany*

Previous studies have evidenced that premature infants exhibit deficits in visual prediction (Emberson et al., 2017) and motor development (Hughes et al., 2016), but the link between both abilities in preterm infants remains unexplored. Therefore, this study aims to investigate the development of predictive abilities and its relation to motor skills in premature infants. We hypothesise that full-term infants will demonstrate higher prediction and motor performances (similar to Schwarzer et al., 2013) compared to preterm infants.

Thus, we will test full-term and preterm infants between 9 and 12 months of age using (i) mental rotation (MR) task and (ii) visual-spatial prediction task.

In the MR task, infants will be habituated to a video of rotating Shepard-Metzler object (0° to 239°), followed by alternative test videos of the unseen angle (240° to 359°) of the habituation object and its mirror object (Gerhard et al., 2021). Preferential looking will be used to measure MR. Similar to Kubicek et al.'s (2017) task with real objects, a novel visual-spatial prediction task will be used. In this task, a box with targets on the left and right side rotates around the vertical axis periodically occluding and revealing the targets. Anticipatory looking, an indicator of visual prediction, will be measured using a stationary eye tracker. Motor skills will be assessed by using the Bayley Scales of Infant Development (Bayley, 2006).

The findings of this study could aid in developing early intervention programs to improve motor skills and predictive abilities in premature infants, potentially bridging developmental gaps.

**Keywords:** Mental rotation, visual-spatial predictive abilities, motor skills, preterm

**Presentation type:** Pre-Data Poster

---

## **How does Task Type Influence the Perception of AI-based versus Human Decisions?**

Mascha E. Gross \*, Deborah Werner , Elisabeth Kals , Christina U. Pfeuffer , Christopher Esch

*Catholic University of Eichstätt-Ingolstadt*

Artificial intelligence (AI) is playing an increasingly significant role in decision-making processes across various domains, from financial services to healthcare and resource allocation. While AI-based systems promise benefits such as improved efficiency, consistency, and scalability, their integration into decision-making processes is dependent on their perceived fairness and users' trust. Here, we use a vignette-based experimental approach comparing several decision scenarios to assess how differences in task type (human vs. mechanical) impact on how trustworthy and fair participants' perceive corresponding AI-based decision-support systems to be. Human-centric tasks involve social or emotional judgment (e.g., evaluating a candidate's team fit), while mechanical tasks are rule-based and data-driven (e.g., optimizing warehouse task allocation). Importantly, we further contrast AI-based decisions with decisions presumably made by a human based on the same information. Understanding how the perception and evaluation of AI-based versus human decisions changes based on task type is essential to derive corresponding suggestions on how to increase the acceptance and adoption of AI-based decision support.

**Keywords:** AI-based decision-making, task type, perceived fairness, trust

**Presentation type:** Pre-Data Poster

---

## **When Control Slips Away: EEG Correlates of Agency and Motivation in Feedback Processing**

Luisa Alessia Grote \*, Daniel Schneider , Stefan Arnau

*Leibniz-Institut für Arbeitsforschung*

The relationship between motivation and perceived control is fundamental to goal-directed behaviour. While Sense of Agency (SoA) and Locus of Control (LoC) are known to influence motivational states, their neural mechanisms and temporal dynamics remain poorly understood. The



proposed EEG-study investigates how feedback inconsistencies affect SoA and subsequent motivational processes using a combination of EEG and behavioural measurements.

In a colour-dominance task, participants will indicate the prevalent colour in dichromatic pixel fields via button press across three conditions: (1) veridical feedback with performance-based rewards, (2) manipulated feedback misrepresenting 33% of correct responses as incorrect through direct feedback, and (3) system-altered responses suggesting technical malfunctions for 33% of correct answers. This design systematically varies mistake-attribution possibilities while maintaining constant task parameters.

We hypothesize to find neural correlates for decreased SoA in conditions 2 and 3, specifically expecting altered CNV amplitudes and attenuated low-frequency oscillatory dynamics associated with prediction making and motor preparation, reflecting upon the detection of feedback inconsistencies resulting in motivational shifts. Additionally, we predict distinct oscillatory patterns reflecting differential attribution processes.

Results will illuminate how feedback (in)consistency shapes agency perception and motivational states at the neural level. Understanding these mechanisms has implications for mental health, work- and educational settings and clinical interventions, particularly in conditions characterized by motivational deficits.

**Keywords:** Sense of Agency, Motivation, Locus of Control, EEG

**Presentation type:** Pre-Data Poster

---

## The perception of time during locomotion

Nathan Han \*, Zongze Chen , Liyu Cao

*Department of Psychology and Behavioural Science, Zhejiang University*

To navigate and accomplish changes within the environment, a sense of time is necessary. Studies show that our perception of time is affected by the movements we perform (De Kock, 2021).

However, time perception, like most cognitive processes, is studied mostly under conditions where the movements of experimental participants are restricted. The increasing sophistication of technologies such as virtual reality or augmented reality (AR) allows for the investigation of cognitive processes under different behavioural states (Nilsson et al., 2018). The planned study aims to investigate differences in time perception while participants are standing or walking through space. The experiment involves participants estimating the duration of visual stimuli presented in different locations within the visual field of AR glasses. Participants are presented with a visual stimulus in

one of five locations (middle, upper, lower, right, and left sides) of the screen. The visual stimulus appears on the screen for durations of 200, 400, 600, or 800ms. Participants then judge the duration of the visual stimulus appearance. The task will be completed while participants are standing still or while they are walking. We are interested in seeing if duration estimation will differ between locomotive states. Furthermore, given the link between space and time perception (Sima & Sanayei, 2024), we want to see if the location of stimulus appearance affects duration estimation, as the location of stimuli in the visual field tends to correspond to different spatial distances (e.g., objects in the lower hemifield tend to be closer).

**Keywords:** time perception, walking, duration estimation

**Presentation type:** Pre-Data Poster

---

## **The Role of Sound, Color, and Translation Method in Emotion Elicitation Using Film Clips: Insights from fNIRS and Self-Report Measures**

Ecem Başkonuş <sup>1</sup>, Osman İyilikci <sup>1\*</sup>, Elvan Arıkan İyilikci <sup>2</sup>

<sup>1</sup> *Manisa Celal Bayar University, Department of Experimental Psychology*, <sup>2</sup> *Ege University, Department of Experimental Psychology*

Previous research has demonstrated that short film clips are effective stimuli for emotion elicitation (e.g., Gross & Levenson, 1995; Schaefer et al., 2010). A recent study on self-report measures showed that film clips can elicit target emotions at moderate to high levels even when specific physical characteristics, such as color, sound, and translation method, are altered (Arıkan-İyilikci et al., 2024). However, recent studies have also found a significant role of physical properties using neuroimaging (e.g., color versus black-and-white, Cao et al., 2024) or psychophysiological measures (e.g., standard subtitles versus aesthetically integrated subtitles, Leveridge et al., 2024). To contribute to this emerging literature, this study will investigate how changes in different physical characteristics and their combinations affect emotion elicitation, using functional near-infrared spectroscopy (fNIRS). By combining fNIRS with self-report measures, this study aims to provide a more in-depth understanding of emotional responses (i.e., target and non-target emotions, arousal, and valence). Additionally, as previous research has primarily focused on highly successful film clips, this study further aims to examine whether the effects of physical properties differ between film clips eliciting target emotions at intense versus moderate levels. It is hypothesized that such physical changes in film clips might play a more significant role in self-reported emotional responses when moderately, but not intensely, emotion-evoking scenes are used.

**Keywords:** Emotion elicitation, film clips, fNIRS, sound, color, translation method

**Presentation type:** Pre-Data Poster

---

## **Musical features predict episodic memory advantage of song vs. speech**

Caroline Kellner <sup>1\*</sup>, Fredrik Ullén <sup>1, 2</sup>, Johanna Rimmele <sup>1</sup>

<sup>1</sup> *Department of Cognitive Neuropsychology, MPI for Empirical Aesthetics*, <sup>2</sup> *Department of Neuroscience, Karolinska Institutet*

Speech and song are fundamental forms of human vocal behavior. Despite their commonalities, song also shows characteristics of music such as its rhythmic and melodic structure. Interestingly, a memory advantage for recalling verbal content has been suggested for song compared to speech. The mechanisms underlying this effect and its neural underpinnings, however, are still unknown. We hypothesize that the rhythmic temporal structure and melodic pitch information in song vs. speech leads to predictive processes recruiting differential neural circuitry, which aid the memorization of song. Therefore, we expect a higher episodic memory performance in the song condition, which is predicted by the rhythmic and melodic structure of song. We hypothesize that additionally both the musical event structure and emotions elicited by the song will have an effect on episodic memory.

To test these hypotheses the young adult, healthy, native German speaking participants will listen to both spoken and sung versions of crime stories and afterwards freely retell what they remember from the stories (immediate recall). Long-term recall will be tested the following day. The stimulus material consists of two short stories by Edgar Wallace that will be recorded spoken and sung by the same speaker. The sung melody is being specifically composed to fit the text. Participants will be assessed for musicality and enjoyment of the music to control for influencing factors. The data will be analyzed using a linear mixed model with memory recall performance as dependent variable and condition (speech, song), and temporal and pitch predictions as independent variables.

**Keywords:** Song, Speech, Predictive Processes, Episodic Memory, Linear Mixed Models

**Presentation type:** Pre-Data Poster

---

## **Investigating the Attentional hypothesis of illusory size perception using the Dynamic Ebbinghaus illusion and SSVEPs**

Athanasios Kokkinakis \*, Junzhen Guo , Nathan Han , Liyu Cao

*Zhejiang University*

The Ebbinghaus illusion involves two identical circles perceived as different in size based on the surrounding shapes/inducers' size and number. Larger inducers make the central circle appear smaller while smaller inducers have the opposite effect. Despite extensive research, a unified explanation remains elusive. While size contrast theories fail to explain stronger effects with shape-matched inducers, Kirsch et al. (2018) propose that the illusion stems from attentional allocation, with greater receptive field recruitment resulting in bigger perceived sizes. However, due to the complexity of the illusion's features, this theory lacks neural data.

We will address these challenges using Steady-State Visual Evoked Potentials (SSVEPs) as an attentional correlate (Norcia et al., 2015) and a dynamic Ebbinghaus variant (Mruczek et al., 2015) which amplifies the circle's perceived size difference from 19.9% to 37.3%. In this version, the main circle moves steadily along the screen while the inducers dynamically change size, enhancing both perceptual effects and thus signal-to-noise ratio. Frequency tagging of the main circle with luminance-based SSVEPs at 24 Hz and two Rapid Invisible Frequency Tagging (RIFT) at 60 Hz with a white and gray background (rendering the main circle invisible), will allow us to isolate attentional mechanisms and provides a robust control condition.

The experiment includes 960 trials per frequency (4 spatial locations × 2 transition directions × 45 trials), with participants rating perceived size changes on a 3-point scale. This design explores the attentional allocation theory, temporal dynamics, grouping effects, and offers a novel EEG-based framework for studying size illusions.

**Keywords:** SSVEP, RIFT, EEG, Ebbinghaus Illusion, Attention, Size

**Presentation type:** Pre-Data Poster

## Linear and Non-Linear Measures of Neural Tracking in Natural Listening Conditions

Felix Körber <sup>1\*</sup>, Cosimo Iaia <sup>1</sup>, Alessandro Tavano <sup>1, 2</sup>

<sup>1</sup> *Institute of Psychology, Goethe University Frankfurt*, <sup>2</sup> *Department of Cognitive Neuropsychology, Max Planck Institute for Empirical Aesthetics*

Neural language tracking in audition is measured by either linear (cerebro-acoustic coherence) or nonlinear (Mutual Information) measures, but such techniques have yet to be compared. In this study, we plan to compare their sensitivity by analyzing a publicly available EEG dataset in English (Brennan, 2023) and collecting and analyzing comparable EEG data from native German speakers with English as a second language, using both German and English stimuli. Participants will listen to German and English audiobook versions of the first chapter of Alice in Wonderland (~12 minutes each, sequence counterbalanced), followed by eight comprehension questions. Brain activity will be recorded using a 64-active-electrode set-up. After EEG data preprocessing (filtering, Independent Component Analysis, normalization), we will calculate cerebro-acoustic coherence (constant lag between auditory stimuli and EEG data) and Mutual Information (Gaussian copula) testing native neural tracking effects across language (English native vs. German native), as well as the effect of nativeness per se (English native vs. English non-native).

### References

Brennan, J. R. (2023). EEG datasets for naturalistic listening to "Alice in Wonderland" (Version 2) [Data set]. University of Michigan - Deep Blue Data.  
<https://doi.org/10.7302/Z29C6VNH>

**Keywords:** Neural Tracking, Cerebro-acoustic Coherence, Mutual Information, EEG, Language Processing

**Presentation type:** Pre-Data Poster

## **Common grounds and the combination of induced insight and reward-based learning – beneficial or harmful?**

Samuel Mertens \*, Kristian Folta-Schoofs

*Neurodidactics & NeuroLab, Institute of Psychology, University of Hildesheim, 31141 Hildesheim, Germany*

Induced insight is the sudden comprehension of a previously unsolved problem through building of novel associations. It has been associated with improved learning and memory performance. This memory-superiority effect was demonstrated to critically depend on the intrinsic reward accompanying induced insight upon completion of the problem. While the effect of intrinsic reward in induced insight already has been investigated, the possible effect of extrinsic reward remained almost unattended, yet. In the context of reward-based learning, extrinsic reward has been associated with enhanced learning and memory performance. However, it also has been shown that administering an extrinsic reward to an intrinsically rewarding behavior diminishes the positive effects of the intrinsic reward in form of an overjustification. The current study aimed to further disentangle the effects of intrinsic and extrinsic reward on learning through induced insight. To this end, we presented Compound Remote Associates (CRA) and compared learning and memory performance using an incidental memory test at the following day. Intrinsic reward was manifested in the correct completion of an item, while extrinsic reward relied on a monetary reward upon correctly solving an item. By employing (generalized) linear mixed models, signal detection theory and measures of metacognitive monitoring, our study aims to further investigate the precise role of extrinsic reward in induced insight. Our data will shed further light on the mechanisms of the memory superiority effect of induced insight. In addition, we will discuss practical implications for using induced insight problems in educational settings.

**Keywords:** Induced insight, sudden comprehension, memory-superiority effect, reward-based learning, overjustification, Compound Remote Associates, metacognitive monitoring

**Presentation type:** Pre-Data Poster

## **Neural Correlates of Social and Emotional Conflict Monitoring.**

Vanessa Mitschke \*, Anne Schacht

*Georg-August-Universität Göttingen*

Inhibiting affiliative facial expressions (such as smiling) has been shown to be more effective when directed towards targets associated with negative behavior. In contrast, inhibiting negative facial expressions (such as frowning), does not significantly affect participants' performance. With results from approach-avoidance tasks indicating that only smiles from positive targets are accompanied by an approach bias, whereas smiles from negative targets did not affect approach-avoidance behavior. This poster will discuss a prospective EEG study, investigating at which processing stage the emotional states of disliked others are likely discounted and if the observation of emotional displays of disliked others is accompanied by an enhanced conflict experience. The study is designed to compare neuronal markers of conflict monitoring and feedback processing during a social target approach and avoidance task, as well as indicators of motor inhibition (N2, P3, conflict SP, FRN). This study aims to integrate theories of cognitive conflict with higher-order social-emotional conflict and the control of facial actions.

**Keywords:** Approach-Avoidance, Conflict, EEG, Inhibition

**Presentation type:** Pre-Data Poster

## **Exploring the Effect of Threat-Related Distractors and their Location Predictability on a Masked Vernier Acuity Task**

Diána Pakai-Stecina \*, Kristian Folta-Schoofs

*Universität Hildesheim*

Based on previous findings (Pakai-Stecina et al., 2023, 2024), threat-related stimuli elicit robust attentional capture when they are presented as distractors during a task. This may arise from both the stimuli's strong emotional valence or their physical features, such as shape. To examine this distractor effect, we presented threatening (e.g. snake, syringe) and shape-matched neutral (e.g., caterpillars, knitting pins) stimuli as peripheral distractors during a central masked Vernier acuity task. Here, we investigated the role of statistical learning and spatial proximity by introducing

predictable (high-probability) and unpredictable (low-probability) locations of threat-related distractors, positioned near or far from the central task.

Analysing modulations of orientation tuning by identifying masked Vernier discrimination, our study examines whether higher-order cognitive evaluation of threat-related stimuli affects visual processing, probably as early as in the primary visual cortex. By exploring the interplay between threat-related information, distractor predictability, proximity and early-level visual processing, our findings will contribute to a better understanding of how cognitive and visual processes interact under conditions of attentional demand.

**Keywords:** inhibition, threat, attentional bias, visual processing

**Presentation type:** Pre-Data Poster

---

## **Decoding Moral and Non-moral Mental States: A Brain-Computer Interface (BCI) Approach**

Jaime A Riascos-Salas <sup>1\*</sup>, Hernan Villota <sup>2</sup>, Diana Gherman <sup>3</sup>, Martin Fischer <sup>1</sup>

<sup>1</sup> *Potsdam University*, <sup>2</sup> *Institución Universitaria de Envigado*, <sup>3</sup> *Brandenburg University of Technology*

This study proposes the feasibility of using a Brain-Computer Interface (BCI) to distinguish between moral and non-moral mental states. We propose an experimental paradigm utilizing a simulated driving scenario, inspired by the Moral Machine game. Participants will experience both "pilot" (active decision-making) and "copilot" (passive observation) conditions, encountering scenarios that evoke moral dilemmas (e.g., sacrificing pedestrians) and non-moral dilemmas (e.g., route choices). Electroencephalographic (EEG) data will be recorded during these scenarios to identify neural correlates of moral and amoral decision-making processes. We hypothesize that distinct patterns of brain activity will emerge, reflecting the engagement of different cognitive and emotional processes. This research contributes to our understanding of the neural basis of moral reasoning and has implications for developing ethical AI systems. Additionally, it explores the potential of BCIs for real-time assessment of mental states in complex decision-making contexts.

**Keywords:** Brain-Computer Interface, Moral Judgment, EEG, Moral Machine

**Presentation type:** Pre-Data Poster



## **Attack of the clones: A preregistered study about ignoring one's own voice**

Stefanie Christina Richthofer \*, Franca Grafe , Jan Philipp Röer  
*Witten/Herdecke University, Witten, Germany*

Our own voice is a very special stimulus. It is an important part of our representation in the world and a key communication tool and of all the sounds we hear in our everyday lives, it belongs to those that we encounter most often. Self-relevant stimuli such as our own name are known for their particularly high attention-grabbing potential, but it is unclear whether this is in fact due to their self-relevance or the strong call for action that is associated with hearing our own name. On this pre-data poster, we introduce a study plan for comparing the disruptive effect of one's own voice to that of another person's voice to investigate whether a self-relevant stimulus without a strong call for action still has the capacity to capture our attention. We will use a classic serial recall paradigm with three auditory conditions: (1) A quiet control condition, (2) an own voice condition, in which participants listen to an artificially generated clone of their own voice, and (3) an other voice condition, where participants listen to the voice of their yoked-control partner. If we observe an own voice effect, we will also explore whether it habituates and is modulated by recognition or resemblance. We look forward to seeing you at our poster and discussing the planned project with you.

**Keywords:** auditory distraction, selective attention, working memory, self-reference, own voice

**Presentation type:** Pre-Data Poster

## **Physiological synchrony during a mindfulness-based intervention in patient dyads with Major Depression**

Simon Sanwald \*, Markus Kiefer

*Section of electrophysiology Ulm University, Ulm, Germany*

The conveying of mindfulness-based interventions in groups is the standard approach in inpatient settings. Understanding interaction processes that take place when patients exercise mindfulness-based interventions would be valuable for the improvement of patient care. Interaction processes during mindfulness-based interventions are best investigated by online-measurement and by a combination of multiple research methods to get a comprehensive picture of the many processes involved in relational aspects ultimately influencing the quality of the experience patients have. Previous studies demonstrated that humans synchronize during social interactions on various levels, i.e., heart rate variability, movements and even brain-activity of interaction partners mutually align with each other over time. The emerging synchrony has been shown to be a predictor of relationship quality, effective emotion regulation processes and even therapeutic alliance. Therefore, we collect data of patient dyads practicing a mindfulness-based intervention while assessing electroencephalogram (EEG), electrodermal activity (EDA) and heart rate variability (HRV) using a hyperscanning approach in combination with video and audio recordings as well as self-reported helpfulness of this patient-patient interaction. After recording, synchrony is quantified by analyzing the consistency of phase differences between the signals over time and the similarity between two signals as a function of time-lag. We assume that patient dyads synchronize on a physiological level and that synchrony is associated with self-reported helpfulness and sympathy. In addition, we will explore the association of synchrony of physiological measures and attachment, empathy, mentalizing ability as well as depression severity.

**Keywords:** Synchrony, EEG, EDA, HRV, Major Depression, mindfulness

**Presentation type:** Pre-Data Poster

## Gaze direction and pupil size in schematic face perception

Frol Saprionov \*, Anke Huckauf

*Faculty of Engineering, Computer Science, and Psychology, Ulm University*

The ability to perceive and interpret facial cues is fundamental to human social interactions, playing a crucial role in communication. Gaze appears to be one of the most important of these cues. It is believed that understanding another person's gaze has evolved as an essential mechanism for social interaction. Several studies both in schematic faces and real faces have demonstrated that participants can easily identify a person staring at them in the crowd, in contrast to others who are not. Nevertheless, the role of fixational eye movements as well as pupil size in face perception is still unclear. In this study, we are going to investigate the effects of fixation direction (left, right, straight, and verging) and pupil size (big and small). The "faces" will be represented as flesh-colored circles with only eyes. The "faces" will differ only in gaze direction and pupil size, resulting in eight combinations (e.g., small pupils and vergent direction). Based on the Eriksen flanker paradigm, participants will be presented with all eight schematic faces arranged in a circle while having to find the face that matches the one presented at fixation. We hypothesize that faces with vergence fixation, straight fixation, and with big pupils will be found faster than the others.

**Keywords:** face perception, gaze direction

**Presentation type:** Pre-Data Poster

---

## Temporal Dynamics of Scene Grammar Representations

Ronja Schnellen <sup>1\*</sup>, Aylin Kallmayer <sup>1</sup>, Melissa Lê-Hoa Võ <sup>1, 2</sup>

<sup>1</sup> *Goethe University Frankfurt, Department of Psychology, Scene Grammar Lab, Germany*, <sup>2</sup> *Neuro-Cognitive Psychology, Department of Psychology, LMU Munich*

To understand, navigate, and interact with complex visual environments, the visual system must continuously perform intricate transformations of incoming sensory information. To enhance efficiency, it can rely on real-world regularities, such as which objects typically occur and co-occur in specific contexts. Scene grammar provides a framework to describe such regularities and the resulting complex relationships between objects in real-world scenes. To explore how scene grammar shapes information processing in the brain, we developed a graph-based representational

model that encodes a scene's grammar – objects and their relationships – into low-dimensional embeddings using Graph Auto Encoders. This visual search study will investigate the alignment between neural representations, measured through EEG, and our graph-based embeddings in a flash-preview gaze contingent moving window paradigm. Using the SCEGRAM dataset, participants will search systematically manipulated scenes designed to violate either semantic relationships (object-context, i.e.: which objects are likely to appear in a scene), syntactic relationships (object-object, i.e.: the typical location of objects in scenes) or both. EEG and eye-tracking data will be collected to measure neural and behavioral responses both in anticipation of and during search. This will offer insight into how, when, and which aspects of scene grammar representations emerge to guide behavior in complex visual tasks. By comparing our structured representations to neural representations over time, Representational Similarity Analysis (RSA) may potentially reveal the timing of neural scene grammar processing in preparation of and during visual search.

**Keywords:** neural representations, EEG, graph autoencoders, SCEGRAM, scene grammar

**Presentation type:** Pre-Data Poster

---

## Interruptions during visual search: Examining the effects of perceptual and cognitive load

Emily Seeligmüller <sup>1\*</sup>, Jeremy M. Wolfe <sup>2,3</sup>, Jan Philipp Röer <sup>1</sup>

<sup>1</sup> *Witten/Herdecke University, Witten, Germany*, <sup>2</sup> *Brigham and Women's Hospital, Boston, USA*, <sup>3</sup> *Harvard Medical School, Boston, USA*

Most visual search experiments are conducted in a quiet environment so that participants can fully concentrate on the focal task without interruption. This is in stark contrast to the real world, which is usually riddled with distractions and interruptions. Many studies have looked into interruption costs using basic and applied visual search tasks and there is ample evidence that we take longer to find what we are looking for when we are interrupted. However, the underlying causes of these costs are presently unclear. This pre-data poster describes a research project in which we plan to systematically investigate the role of perceptual and cognitive load. In previous studies, interruptions were rather heterogenous and often either low or high in both perceptual and cognitive load, making it difficult to evaluate their relative contribution. In the planned research project, we will use a classic visual search task and an orthogonal manipulation of perceptual and cognitive load. During the interruption, participants will perform a running memory span task. The items will be clearly visible

(low perceptual load) or masked with Gaussian visual noise (high perceptual load) and participants will recall the last item (low cognitive load) or the last four items on the list (high cognitive load). We will ask if the effects of perceptual and cognitive aspects of an interruption are additive and whether one type of interruption seems to be more potent than the other. We welcome any feedback and look forward to discussing the planned project with you.

**Keywords:** visual search, interruption, cognitive load, perceptual load

**Presentation type:** Pre-Data Poster

---

## **Action without visual awareness: an experimental examination into the role of visual awareness and visual attention for the control of visually guided action**

Didem Taskiran \*, Frederic Göhringer , Thomas Schenk

*Ludwig-Maximilians-Universität München*

Motor movements often require corrections, some of which may be triggered by environmental changes that we are not perceptually aware of. In their study, Goodale et al. (1986) demonstrated that despite being unaware of the changes in target position during saccadic eye movements, participants pointing movements adjusted to account for those changes. This implies a robust visuomotor system operating independently of conscious awareness and cognitive resources. The current study aims to test these implications, by examining the performance of the visuomotor system under single-task and dual-task conditions. In order to achieve this, participants undergo pointing tasks with gaze-contingent target shifts, combined with an auditory n-back task, while their hand and eye movements are recorded. Since secondary tasks are known to impair performance on primary tasks, namely the dual-task interference, we test whether saccadic and corrective pointing movements to unperceived target shifts are resistant to such interference. Hand and eye movement metrics, such as pointing and saccade accuracy, along with n-back performance, are compared across conditions. A separate two-alternative forced-choice (2AFC) task evaluates participants' perceptual awareness to gaze-contingent target shifts, enabling analysis of its relationship with corrective movements. This approach aims to determine whether motor corrections rely on central cognitive resources and to clarify the role of perceptual processes in these adjustments.

**Keywords:** Motor control, Visual perception, Multitasking, Perception-Action Model, Dorsal stream, Ventral stream

**Presentation type:** Pre-Data Poster

---

## How Speed, Frequency, and Duration of Bilateral Stimulation in EMDR Influence Memory Performance

Zeynep Tunçel Lieflander \*

*Ulm University*

Eye Movement Desensitization and Reprocessing (EMDR) is a structured psychotherapy widely used for trauma-related disorders, with bilateral stimulation (BLS) as a core component. BLS, often delivered through guided eye movements, is hypothesized to mimic rapid eye movement (REM) sleep mechanisms, facilitating memory reprocessing. While extensively studied in clinical populations, the effects of BLS on declarative, emotional, and social memory in healthy individuals remain underexplored, particularly regarding the role of parameters such as speed, frequency, and duration.

This study aims to investigate how BLS influences memory processes in healthy university students, with a secondary focus on the impact of varying BLS parameters. In a within-subject experimental design, participants will complete baseline assessments for declarative (e.g., number sequence recall), emotional (e.g., recollection of evocative images), and social (e.g., recall of past interactions) memory. BLS will then be administered using a light device, systematically varying speed, frequency, and duration. Post-stimulation assessments will measure changes in memory performance, with repeated-measures ANOVA analyzing the effects of memory type and BLS parameters.

We hypothesize that BLS will enhance memory performance, with parameter variations producing task-specific effects. Faster speeds and higher frequencies may optimize emotional or declarative memory, while slower speeds and longer durations may benefit social memory.

This research explores broader applications of gaze-based interventions, including potential enhancements in learning, emotional regulation, and social cognition. Insights into the role of BLS parameters may inform the optimization of EMDR protocols and future studies on gaze behavior and memory.

**Keywords:** EMDR, bilateral stimulation, memory processes, declarative memory, emotional memory, social cognition, gaze-based interventions

**Presentation type:** Pre-Data Poster

---

## **The Spatial Specificity and Recovery of Visual Adaptation in Causal Perception**

Laura van Zantwijk \*, Martin Rolfs , Sven Ohl

*Department of Psychology, Humboldt-Universität zu Berlin, Germany*

Humans report a vivid and automatic impression of causality in launching events, in which one object approaches a stationary second object, and the second object starts moving in the same direction after the two objects collide. Visual adaptation can alter this perception of causality (Rolfs et al., 2013): In ambiguous test events, fewer launches are reported after viewing a stream of launch events. In the planned study, we aim to determine 1) the spatial specificity of this effect and 2) how the perception of causality recovers from adaptation. Observers will be presented with ambiguous test events ranging from launching to passing events by manipulating the disc overlap of these two objects. Critically, we collect the proportion of reported launches before, during, and after adapting to launching events. To measure the spatial specificity of visual adaptation, events are presented at five different horizontal locations (–3, –1.5, 0, 1.5, 3 dva from the adapted location). We predict that the adaptation will be specific to the adapted location, vanishing with distance from the adapted location. Moreover, we predict that observers will perceive fewer launches during adaptation as compared to before, and after adaptation. By testing the magnitude of adaptation in different experimental phases, we will determine the timecourse and completeness of the recovery after adaptation. These results will help us reveal the spatiotemporal adaptation profile for the perception of causality and allow us to contrast it with known adaptation responses to well-established low-level features in the visual system.

**Keywords:** causality, visual adaptation, perception

**Presentation type:** Pre-Data Poster

## **The Influence of Procedural and Distributive Fairness in AI-Supported Decision-Making on Trust, Acceptance, and Adoption**

Deborah Werner <sup>\*</sup>, Mascha E. Gross , Elisabeth Kals , Christina U. Pfeuffer , Christopher Esch  
*Catholic University of Eichstätt-Ingolstadt*

Artificial Intelligence (AI) is increasingly applied in decision-making processes, yet the influence of procedural and distributive fairness on the perception of AI-supported decisions remains to be further examined. In this vignette study, we aim to systematically manipulate the procedural fairness as well as distributive fairness of allocation processes in different situational scenarios. Procedural fairness will be manipulated by varying the degree of information participants receive about the respective allocation process. Distributive fairness will be manipulated by varying whether the allocation outcome is favourable or unfavourable for participants. Crucially, we compare a condition in which the corresponding allocation process is described as entirely AI-based with a condition in which the same information is gathered, but the allocation process is described as depending on a human decision-maker. We examine the perceived fairness and trust in the respective conditions and their influence on the acceptance and adoption of AI-based versus human decisions. We will further assess the influence of participants' baseline propensity to trust on their condition-specific perception and evaluation of AI-based versus human decision-making processes. Based on our findings, we aim to contribute to guidelines for designing AI systems that are perceived as fair and trustworthy, enhancing their acceptance to support more efficient decision-making via the usage of AI.

**Keywords:** AI-based decision-making, procedural fairness, distributive fairness, trust, acceptance

**Presentation type:** Pre-Data Poster



## **Social feedback processing of metaperceptions among Chinese immigrants in Germany**

Guanghou Zhou \*, Xiong Hu , Svenja Taubner , Christoph Korn

*Heidelberger Center for Transcultural Studies, University of Heidelberg*

How do members of minority groups update their beliefs about how the majority group perceives them when they receive direct social feedback from either in-group or out-group sources? Social Identity Theory (SIT; Tajfel & Turner, 1986) and System Justification Theory (SJT; Jost & Banaji, 1994) offer conflicting perspectives. While SIT suggests that individuals prioritize positive feedback from their own group and resist out-group input (an in-group positivity bias), SJT posits that members of lower-status groups may question overly favorable evaluations of their group (an in-group negativity bias).

-- Using the paradigm developed by Korn et al. (2012), the present study examines how Chinese sojourners in Germany process social feedback about their meta-perceptions. In a pilot study, Chinese (n=50) and German (n=50) participants provide trait ratings in response to the question, "How do most Germans view Chinese?" These ratings then serve as social feedback in a 2 (Feedback Desirability: Desirable vs. Undesirable) × 2 (Feedback Source: Chinese vs. German) repeated-measures design with a new sample of Chinese participants (n=150), who update their initial ratings after receiving feedback. It is hypothesized that SIT will prevail over SJT, such that an interaction between feedback desirability and feedback source will drive social feedback processing: participants will more readily incorporate desirable feedback from Chinese peers (in-group positivity bias).

**Keywords:** Acculturation, Meta-stereotypes, Intergroup hostility, Social feedback processing

**Presentation type:** Pre-Data Poster

## AUTHOR INDEX

### A

Abel, Magdalena 187, 367  
 Acar, Başak 500  
 Adam, Kirsten 202  
 Aeschbach, Samuel 49  
 Agrawal, Aakash 204  
 Agrawal, Annika 484  
 Ahle, Judith 131  
 A-Izzeddin, Emily J 344  
 Akarsu, Selma 562  
 Akbari, Elaheh 354  
 Akbarifathkouhi, Elaheh 299  
 Akyurek, Elkan 76  
 Albert, Josefine 355  
 Alikadic, Lejla 355  
 Allenmark, Fredrik 166, 168  
 Alo, Nisa 356  
 Alodie Rey-Mermet 24  
 Alokuzay, Rico 357  
 Alves, Hans 60, 155, 541  
 Al-Zoubi, Ayman 466  
 Amado, Sonia 358, 370, 386, 434  
 Amorim, Maria 82  
 Andrade, Christian 359  
 Anhalt, Rik 275  
 Ansoerge, Ulrich 410, 428  
 Antes, Nicole 237, 250, 325  
 Anton Koger 39  
 Anton, Sarah Sophie 238  
 Arikan İyilikci, Elvan 360  
 Arikan İyilikci, Elvan 573  
 Arikan, Belkis Ezgi 361  
 Arnau, Stefan 571  
 Artyom Zinchenko 40  
 Asokan, Tharanirakshita 362, 570  
 Asthana, Manish Kumar 257, 332, 465  
 Attanasio, Giuseppe 99  
 Attig, Christiane 363

Aurich, Fabian 259  
 Aust, Rouven 364  
 Aydin, Talip Ata 365  
 Aydınlık, Ayşegül 358  
 Azañón, Elena 239, 288, 454

### B

Bach, Dominik 140, 306, 567  
 Bading, Karoline 151, 152, 545  
 Baek, Seung-Cheol 240  
 Baess, Pamela 241, 392  
 Bahçekapılı, Hasan Galip 387  
 Bahn, Daniela 535  
 Bajwa, Jaskirat 471  
 Bajwa, Kamaljit 471  
 Baldauf, Marlena 242  
 Baltaretu, Bianca 243, 532  
 Banh, Ngoc Chi 366  
 Bara, Ionela 66  
 Barbara Kaup 35  
 Barnow, Sven 215  
 Barrionuevo, Pablo A. 244  
 Barth, Marius 152  
 Bartl, Johannes 186, 367  
 Basgol, Hamit 368  
 Başkonuş, Ecem 573  
 Basoeki, Feron Y. 369  
 Bast, Nico 245  
 Basten, Ulrike 217  
 Batır, Büşra 358, 370  
 Bauer, Adrian 488  
 Baumert, Philine 94  
 Bäuml, Karl-Heinz 187  
 Bäuml, Karl-Heinz T. 186  
 Bausenhardt, Karin M. 138  
 Bayen, Ute J. 172, 414  
 Baykan, Cemre 246  
 Beck, Ann-Kathrin 217, 262  
 Beckers, Tom 306

Beckmann, Lisa 247, 283  
 Behrens, Laurin 266  
 Beitner, Julia 563  
 Belin, Pascal 550  
 Bella-Fernandez, Marcos 392  
 Bella-Fernández, Marcos 118  
 Belleville, Sylvie 499  
 Beltrán, David 54  
 Béna, Jérémy 152  
 Bendel, Oliver 220  
 Bender, Moritz 231  
 Bendixen, Alexandra 247  
 Bendszus, Martin 502  
 Benedict, Taylor 148  
 Bengelsdorf, Julia Luisa 44  
 Benini, Elena 194, 323  
 Bennewitz, Roland 294  
 Berens, Eva-Maria 247  
 Berger, Alexander 371  
 Bergström, Kirstin 262  
 Berio, Leda 103  
 Bermeitinger, Christina 183, 241, 376, 392  
 Bernau, Johannes 541  
 Berner, Nele 371  
 Bernhardt, Lara 65  
 Bernstein, Daniel 471  
 Berti, Stefan 372  
 Beste, Christian 320  
 Bhat, Manjiri 114  
 Bhatia, Kriti 564  
 Bhatt, Mehul 299  
 Bianchi, Federico 99  
 Biba, Thomas 254  
 Biedermann, Alexander 275  
 Bielak, Jan 349  
 Biermeier, Kai 125  
 Biesaga, Mikołaj 248  
 Billino, Jutta 535  
 Binder, Lucie 373  
 Binz, Marcel 48  
 Blask, Katarina 247  
 Blau, Matthias 232  
 Blech, Christine 374, 435  
 Bledowski, Christoph 77, 384, 550, 557  
 Blöck, Alexander 375

Blossey, Lisa 488  
 Blümel, Laura 357  
 Böckler, Anne 331, 457  
 Bodemer, Daniel 182  
 Boeltzig, Marius 184, 461  
 Böer, Nils Tobias 132  
 Boeve, Sam 100  
 Böffel, Christian 251, 349, 415  
 Bogaerts, Louisa 100, 109  
 Bogenschütz, Luisa 376  
 Bohnemeyer, Juergen 137  
 Boila, Chiara 52  
 Bolte, Conrad 439  
 Bönsch, Andrea 229  
 Boone, Jan 161  
 Börger, Daria 319  
 Boubenec, Yves 481  
 Boysan, Murat 379  
 Braack, Malte 290  
 Brandenburg, Stefan 376  
 Brandt, Thorben 376  
 Brattico, Elvira 73  
 Bratzke, Daniel 377  
 Braun, Doris I. 378  
 Braun, Selina 545  
 Bravo Serra, Susana 253  
 Brede, Max 305  
 Breitwieser, Jasmin 210  
 Bressem, Kim-Aljoscha 398, 565  
 Brod, Garvin 210  
 Broda, Maximilian 299  
 Bröder, Arndt 169, 170, 177, 379  
 Brüning, Jovita 249, 328  
 Budak, Leyla 379  
 Bulatova, Olya 202  
 Burkhardt, Laura 250  
 Busch, Nuno 58  
 Butowska-Buczyńska, Ewa 171

## C

Cabral-Calderin, Yuranny 252  
 Cadena-Valencia, Jaime 515  
 Çakır, Mehtap 352

Caldaroni, Silvia 211  
 Çalışkan, Onur 559  
 Cambronero Delgadillo, Alejandro Javier 478  
 Camisa, Alice 566  
 Campagna, Marella 68  
 Cancio Pastor, Tessa 80  
 Cao, Liyu 89, 334, 463, 539, 556, 572, 575  
 Carbon, Claus-Christian 65, 68, 287, 297, 335, 487  
 Cardaropoli, Francesca 520  
 Carina G. Giesen 30, 38  
 Carrasco, Marisa 281  
 Cassani, Giovanni 99  
 Cavdan, Müge 252, 380  
 Celebi, Bora 252, 380  
 Celebi, Fatma 483  
 Çelik, Emin 235  
 Cepero, Laura 54  
 Cermak, Nora 131  
 Cezanne, Yannick 357  
 Chen, Qingyuan (Rachel) 281  
 Chen, Shitao 539  
 Chen, Siyi 168  
 Chen, Zongze 572  
 Cheng, Stephanie 127  
 Chetail, Fabienne 109  
 Choksi, Bhavin 236, 547  
 Christensen, Julia F. 253  
 Chu, Qian 254  
 Chuquichambi, Erick 70  
 Ciardo, Francesca 104  
 Clarke, Alasdair 114  
 Classen, Martin 349  
 Claudine Pulm 27  
 Clausen, Alexandra E. 150  
 Clauss-Beggerow, Luca 381  
 Clemente, Ana 317  
 Cogitate, Consortium 303  
 Colombo, Michael 206  
 Colosio, Alessandro 161  
 Conci, Markus 255, 350  
 Conrad, Samuel 382  
 Corbelli, Giuseppe 211  
 Corneille, Olivier 149  
 Cornejo Marin, André 254  
 Courage, Isabel 200

Cracco, Emiel 62  
 Cramer, Felix 383  
 Cross, Emily 66  
 Crusius, Jan 62  
 Cubillas, Carmelo P. 91  
 Czernochowski, Daniela 262, 391

## D

Daeglau, Mareike 231  
 Daikoku, Tatsuya 322  
 Danek, Amory 173  
 Danna Oomen 30  
 Danwitz, Ludwig 256  
 Dar, Kaneez Fatima 257  
 Dar, Reuven 313  
 Darnstaedt, Daniel 257  
 Darrah, Samantha 43  
 Dayan, Peter 368  
 Dayan, Reout 274  
 de Haas, Ben 258  
 de Haas, Benjamin 299  
 De Houwer, Jan 190  
 de la Fuente, Dorian 216  
 De la Fuente, Dorian 217  
 de Paula Couto, Clara 64  
 De Varda, Andrea Gregor 101  
 de Vries, Olivier 140, 567  
 Debener, Stefan 231  
 Debnath, Carina 325  
 Dedetas Satir, Hatice 383  
 Degro, Mia 487  
 Dehaene, Stanislas 303  
 Demirel, Vianne 125  
 Denin, Marco 157  
 Denul, Ayala 161  
 Dercksen, Tjerk 259  
 Désirée N. Schöning 28  
 Deutsch, Philipp 384, 550, 557  
 Devylder, Simon 130  
 D'Hooge, Serena 152, 153  
 Dibbets, Pauline 141  
 Dignath, David 383, 385  
 Dirk U. Wulff 26

Dittrich, Monique 260  
 Diwadkar, Vaibhav 261  
 Dobs, Katharina 338, 354, 483  
 Doerfel, Denise 214  
 Domes, Gregor 316  
 Donkers, Isabel 346  
 Donkin, Chris 262, 314, 569  
 Donkin, Christopher 538  
 Dorrough, Angela 62, 398  
 Doval, Sandra 491  
 Draschkow, Dejan 453  
 Dreisbach, Gesine 309, 340, 413, 551  
 Drawing, Knut 252, 288, 294, 380  
 Dubravac, Mirela 324  
 Dudschig, Carolin 13, 51, 53, 520  
 Dupont, Dawa 124  
 Durmuş, Belkıs 358, 386  
 Düzgün, Şevval 387

## E

Ebener-Priemer, Ulrich 209  
 Eberhardt, Lisa 388  
 Ebert, Cornelia 448  
 Ebert, Miro 389  
 Ebrahimi, Zhino 262  
 Echterhoff, Gerald 554  
 Eckerskorn, Franziska 472  
 Eder, Andreas 263  
 Edtstadler, Konstanze 107  
 Ehret, Jonathan 229  
 Ehritt, Emilia 548  
 Eickhoff, Simon 285  
 Einhäuser, Wolfgang 247, 390  
 Eisenhauer, Susanne 206  
 Ekinci, Mustafa Alperen 568  
 Ellermeier, Wolfgang 417  
 Ellinghaus, Ruben 159  
 Elpelt, Jonas 264, 522  
 Embrey, Jake 262  
 Engel, Jana 501  
 Engelmann, Neele 50  
 Engeser, Micha 265, 303  
 Erdfelder, Edgar 178, 293, 471

Ermert, Cosima A. 229  
 Esch, Christopher 571, 587  
 Esghaei, Abdolmoein 515  
 Eymann, Vera 391

## F

Fairhurst, Merle 8  
 Falanga, Luigi 266  
 Farahi, Fahima 253  
 Faßbender, Kaja 93  
 Faujdar, Kapil 465  
 Fazio, Lisa 180  
 Feld, Gordon B. 563  
 Feldmann-Wüstefeld, Tobias 267  
 Fels, Janina 229  
 Fenn, Julius 494  
 Fenske, Pia 392  
 Fernández-López, Maria 203  
 Ferreira, Rosário 470  
 Ferrer-Mendieta, Alicia 392, 569  
 Fetterroll, Dominik 393  
 Fetzer, Lara 394  
 Fiebach, Christian 481, 547  
 Fiebach, Christian J. 206, 207  
 Fiedler, Klaus 46, 308  
 Fiedler, Susann 309  
 Fiehler, Katja 243, 361, 532  
 Figueroa, Alec 239  
 Finke, Kathrin 122  
 Fischer, Cora 77, 384, 550  
 Fischer, Martin 579  
 Fischer, Martin H. 220  
 Fischer, Rico 249, 333, 340, 432, 551  
 Fleddermann, Marie-Therese 131, 134  
 Fleming, Stephen 416  
 Flieger, Philipp 395  
 Flintrop, Simon 363  
 Florian Schmiedek 32  
 Foerster, Anna 396  
 Fohs, Saskia 77  
 Foltá-Schoofs, Kristian 381, 546, 577, 578  
 Folyi, Timea 268  
 Fooker, Jolande 397

Ford, Daria 181  
 Förner, Eva 402  
 Forst, Sarah 269  
 Foucher, Valentin 270  
 Franco-Martínez, Alicia 569  
 Frank, Celine 398  
 Franke, Hannah 329  
 Franke, Kira 63  
 Franke, Thomas 363  
 Franz, Volker H. 144, 368, 375, 412, 564  
 Fraustein, Paula 414  
 Freiberg, Jannes 238, 371, 403  
 Frenzel, Anne C. 460, 472, 506  
 Frenzel, Tina 247  
 Freyer, Marion 398, 565  
 Friebe, Kassandra 270  
 Friederich, Hans-Christoph 502  
 Friedrich, Jannis 400  
 Frieler, Klaus 253, 302  
 Frings, Christian 192, 271, 316, 329, 332, 342, 421, 468, 470, 478, 482, 525  
 Frischkorn, Gidon T. 200  
 Fröber, Kerstin 401  
 Fuchs, Susanne 278  
 Fukuda, Keisuke 202, 561  
 Fuławka, Kamil 47  
 Furley, Philip 134

## G

Gade, Miriam 84, 86, 542  
 Gado, Sabrina 142, 457  
 Gagl, Benjamin 18, 97, 98, 205, 206  
 Gamer, Matthias 142, 339  
 Gao, Dorothy 536  
 Gaschler, Robert 403, 435, 543  
 Gast, Anne 148, 156  
 Gaube, Susanne 298  
 Gegenfurtner, Karl 276, 408  
 Gegenfurtner, Karl R. 244, 330, 378  
 Gehring, Dominic 555  
 Gehrke, Rowena 403  
 Geissler, Christoph 421  
 Geißler, Christoph 271

Gelagin, Luke 262, 569  
 Genc, Sura 404  
 Genschow, Oliver 60, 61, 62  
 Gentner, Dedre 136  
 Gentsch, Kornelia 213  
 Georgiadis, Petros 243  
 Gerbino, Maria 211  
 Gerharz, Leonard 516  
 Germar, Markus 272, 376  
 Gernandt, Emily 69  
 Gerten, Sina Janine 405  
 Getu, Amroté 105  
 Getzmann, Stephan 18, 230  
 Geyer, Thomas 164, 165, 167  
 Gezen, Elif 406  
 Gherman, Diana 579  
 Ghobadi, Aida 264  
 Giebeler, Yasmina 273  
 Gierlich, Martina 237  
 Giersiepen, Maren 291, 406, 407  
 Giesen, Carina 63, 64, 188, 191, 263  
 Giesen, Carina G. 192  
 Giger, Jean-Christophe 218  
 Gil Rodriguez, Raquel 408  
 Gilaie-Dotan, Sharon 274  
 Gil-Gómez de Liaño, Beatriz 116, 118, 392, 491  
 Giorjani, Giuliana 356  
 Giurgiu, Marco 209  
 Glaab, Sophie 275  
 Glöckner, Andreas 269  
 Goettker, Alexander 276  
 Goetz, Itay 65  
 Göhringer, Frederic 584  
 Gokce, Ahu 409  
 Gollan, Benedikt 410  
 Gollwitzer, Mario 351  
 Gonzalez, Raphaella 410  
 Göppert, Frieder 412  
 Gotthardt, Daniel 479  
 Göttmann, Jan 280, 509  
 Götz, Felix 413  
 Grab, Anna Thereza 570  
 Grabenhorst, Matthias 277  
 Graf, Patricia 445  
 Grafe, Franca 580

Grainger, Jonathan 206  
 Granacher, Urs 555  
 Green, C. Shawn 150  
 Gregori, Alina 278  
 Gregori, Fulvio 211  
 Greisiger, Klara 473  
 Grenzebach, Jan 398  
 Grigutsch, Maren 240  
 Grimm, Angela 52  
 Grimm, Giso 231  
 Gross, Jörg 7  
 Groß, Julia 44  
 Gross, Mascha E. 540, 571, 587  
 Grote, Luisa Alessia 571  
 Gruber, Sophia 338  
 Gugerell, Daniel 410  
 Guido Hesselmann 25  
 Gülденpenning, Iris 132, 133  
 Gülденpenning, Iris 41  
 Gümüşdaglı, Fabian E. 414  
 Gündüz, Beyza 414  
 Günseli, Eren 78  
 Günther, Fritz 99  
 Güntürkün, Onur 206  
 Guo, Dingrong 446  
 Guo, Junzhen 575  
 Guo, Wei 349  
 Gupta, Siddhima 411  
 Gurbuz, Emre 279, 409  
 Gututui, Mihail 379  
 Gutzeit, Julian 90

## H

Haaf, Julia 85, 87  
 Haag, Vivienne N. 170  
 Hackländer, Ryan 183, 376  
 Haehn, Luise 415  
 Hagemann, Dirk 199  
 Hagihara, Hiromichi 242  
 Hagmann, Katharina 488  
 Haider, Hilde 531, 548  
 Halamish, Vered 175, 176  
 Halder, Theresa 307

Hamaloglu, Simge 416  
 Hamburger, Kai 537  
 Han, Nathan 572, 575  
 Hanczakowski, Maciej 171, 174, 484  
 Hanh, Adam 61  
 Hanning, Nina 281  
 Hantelmann, Philipp 451  
 Harpaintner, Marcel 145  
 Harrison, William J 344  
 Hartmann, Raphael 225, 494  
 Haslbauer, Aaron 555  
 Hassanzadeh, Mitra 417  
 Hato, Tugba 418  
 Hauser, Lukas 107  
 Häusser, Jan 475  
 Hayn-Leichsenring, Gregor 72  
 Hebart, Martin 562  
 Hebart, Martin N. 530  
 Hebert, Oliver 448  
 Hecht, Heiko 536, 550  
 Hedjar, Laysa 408  
 Hegewald, Janice 565  
 Heggenberger, Anna 303, 326, 419  
 Hein, Elisabeth 420, 450  
 Heißler, Eva-Marie 282  
 Held, Leslie 161  
 Hell, Lorena 421  
 Hemmer, Pernille 90  
 Hemming, Wiebke 199, 421  
 Henik, Avishai 283  
 Hennig, Hannah Z. 198  
 Hensel, Laura 127  
 Hensel, Laura B. 20  
 Herbort, Oliver 283  
 Hershman, Ronen 283  
 Hertwig, Ralph 47, 48  
 Hesselink, Emily 453  
 Hesselmann, Guido 146  
 Hey, Carolin V. 172  
 Hildebrandt, Lea 339  
 Hilla, Yannik 125  
 Hinojosa, José Antonio 359  
 Hinterwimmer, Stefan 448  
 Hirsch, Patricia 422, 566  
 Hitsuwari, Jimpei 284

Hoehne, Sophie 423  
 Hof, Linus 423  
 Höffler, Dana 157  
 Hoffmann, Janina A. 426  
 Hoffstaedter, Felix 285  
 Höfler, Margit 478  
 Höflinger, Alisa 428  
 Hofmann, Philipp 224  
 Höhle, Barbara 110  
 Hohmann, Volker 231  
 Höhnel, Leonhard 517  
 Höhs, Johanna M. 288  
 Hollmann, Jannika 424  
 Holt, Daniel V. 215  
 Hölter, Madlen 444  
 Hommel, Bernhard 221  
 Hong, Injae 117  
 Hoogerbrugge, Alex J. 286  
 Horbach, Josefine 425  
 Horstmann, Gernot 462  
 Hosch, Ann-Katrin 256, 426  
 Howard, Megan 449  
 Hsieh, Shulan 510  
 Hu, Xiong 588  
 Huang, Pi-Chun 510  
 Huber, Anja 291  
 Huber, Isabella 287  
 Huber, Tanja 564  
 Hübner, Carolin 429  
 Hübner, Ronald 67, 72  
 Huckauf, Anke 300, 352, 388, 410, 582  
 Huestegge, Lynn 427, 455  
 Huff, Markus 416, 488  
 Hughes, Anna 114  
 Huisman, Thirsa 228, 427  
 Hussain, Zak 49  
 Hütter, Mandy 46, 151, 152, 153, 157, 288

## I

Iaia, Cosimo 207, 340, 424, 547, 576  
 Illes, Aniko 71  
 Ince, Melis 429  
 Ingendahl, Franziska 15, 20, 155, 176

Ingendahl, Moritz 155, 541  
 Ingrid Scharlau 26, 29  
 Ishi, Carlos 508  
 Iwai, Ritsuko 508  
 İyilikci, Osman 573  
 Izydorczyk, David 430

## J

Jaarsveld, Saskia 262  
 Jack E. Taylor 36  
 Jacobsen, Thomas 284, 466, 499  
 Jan Tünnermann 26  
 Jan Tünnermann 29  
 Janczyk, Markus 19  
 Janczyk, Markus 160  
 Janczyk, Markus 163  
 Janczyk, Markus 401  
 Janczyk, Markus 426  
 Janczyk, Markus 462  
 Janczyk, Markus 480  
 Janczyk, Markus 564  
 Jankowiak, Sylvia 565  
 Janos Pauli 36  
 Jansen, Petra 224, 389  
 Jeglinski-Mende, Melinda A. 220  
 Jekel, Marc 269  
 Jejelati, Abdullah 430  
 Jenkins, Holly 135  
 Jescheniak, Jörg D. 431  
 Jeschke, Michaela 288  
 Jiménez, Mikel 359  
 Johannsen, Leif 223, 225, 226, 227  
 Jones, Ellen 453  
 Jost, Charline 565  
 Jost, Leonardo 389  
 Jovanovic, Bianca 289, 362, 464, 570  
 Julia Karbach 32  
 Jung, Amelie C. 432

## K

Kaça, Gülin 353  
 Kaczmarek, Christian 303, 433



- Kaernbach, Christian 290  
 Kaiser, Daniel 265, 338, 395, 568  
 Kaiser, Jakob 291, 406, 407  
 Kaiser, Jochen 77, 384, 550, 557  
 Kaja Faßbender 31  
 Kalia, Suneil 254  
 Kallmayer, Aylin 292, 582  
 Kals, Elisabeth 571, 587  
 Kammer, Thomas 143  
 Kamp, Siri-Maria 293, 444  
 Kanakogi, Yasuhiro 242  
 Kaniuth, Philipp 530  
 Kanske, Philipp 213  
 Kapinos, Lennart 190  
 Kappas, Arvid 221  
 Kapucu, Aycan 293, 337, 353, 358, 434, 500, 559  
 Karataş, Murat 358, 434  
 Karbach, Julia 216, 217  
 Karg, Friederike Margareta 65  
 Karin M. Bausenhart 35  
 Karsten, Karoline 435, 543  
 Kaschube, Matthias 264, 522  
 Kassaye, Nueud 273  
 Kastrinogiannis, Alexandros 141  
 Kathrin Finke 26, 29  
 Katircilar, Didem 294  
 Katsarava, Mariam 543  
 Kattner, Florian 150, 295, 382, 417  
 Kaup, Barbara 51, 52, 138, 520, 545  
 Kauschke, Christina 535  
 Keha, Eldad 283, 435  
 Kelber, Paul 436  
 Keller, Kim 437  
 Kellerwessel, Klaus 71  
 Kellner, Caroline 574  
 Kellner, Stefanie 438  
 Kemeny, Ferenc 107  
 Kempkens, Niels 87  
 Keshavarz, Behrang 372  
 Khader, Patrick 439  
 Khorsandi, Shahrzad 253  
 Kiefer, Markus 143, 145, 371, 443, 581  
 Kielmann, Sven 527  
 Kienitz, Ricardo 534  
 Kiesel, Andrea 162, 197, 223, 225, 226, 227, 435, 494, 555  
 Kieseewetter, Heike 487  
 Kim, Seung-Goo 240, 296, 440  
 Kingir, Ege 515  
 Kirfel, Lara 50  
 Klabunde, Adrian 441  
 Klaffehn, Annika 22  
 Klaffehn, Annika L. 92  
 Klaffer, Karsten 442  
 Klaiber, Ingo 443  
 Klarlund, Mathias 73  
 Klatte, Maria 430  
 Klauer, Karl Christoph 530  
 Klausning, Wiebke 513  
 Kleinert, Tobias 349  
 Kliegl, Oliver 186  
 Klodmann, Julian 488  
 Kloeckner, Nils 297  
 Kloß, Yanick 347, 444  
 Knoblich, Günther 270  
 Knoll, Carsten 477  
 Knopf, Luisa 293, 444  
 Koch, Iring 85, 106, 194, 223, 225, 226, 227, 266, 315, 422, 456, 510, 529, 566  
 Koch, Irving 323  
 Koester, Dirk 405, 445  
 Koevoet, Damian 336  
 Koger, Anton 223, 225, 227  
 Köhler, Anna-Lena 456  
 Kokje, Eesha 298  
 Kokkinakis, Athanasios 575  
 Koleva, Plamenna B. 229  
 Kollenda, Diana 299  
 Koller, Nadine 446  
 Kondyli, Vasiliki 299  
 Königsmark, Varg Thore 454  
 Koob, Valentin 19, 160, 163  
 Kopp, Stefan 407  
 Körber, Felix 576  
 Korka, Betina 259  
 Korn, Christoph 588  
 Kornemann, Lukas 140  
 Körner, Anita 452  
 Körner, Christof 478

Köseoglu, Jale 445  
 Köster, Moritz 242  
 Kovoer, Joel 453  
 Kozlova, Olga 202  
 Kozyreva, Anastasia 237  
 Krause, Anika 447  
 Krause, Lisa-Marie 283, 448  
 Krause, Noa 449  
 Krefeld-Schwalb, Antonia 282  
 Kreichman, Olga 274  
 Krems, Greta Josephin 472  
 Kressig, Reto W. 555  
 Kriegeskorte, Meike 420, 450  
 Krishna, Anand 263  
 Kristjánsson, Árni 13, 17  
 Kristjánsson, Árni 118  
 Krocze, Leon 232  
 Kroneisen, Meike 179, 293  
 Krug, Alina 270, 300  
 Kruijne, Wouter 76  
 Kruse, Ulrike 450  
 Kübler, Sebastian 455, 459, 517  
 Kubota, Jennifer 305  
 Kuchle, Elias 375  
 Kuhlen, Anna K. 315  
 Kuhlen, Torsten W. 229  
 Kuhlmann, Beatrice 174  
 Kuhlmann, Beatrice G. 170, 178, 198, 288, 336  
 Kuhlmann, Kerstin 451  
 Kühlwein, Tobias 301  
 Kühn, Kevin 134  
 Kühne, Katharina 22, 220  
 Kulesza, Wojciech 60  
 Kullik, Joanna 452  
 Kumada, Takatsune 508  
 Kumle, Levi 453  
 Kunde, Wilfried 195, 196, 321, 444, 509, 533, 541  
 Kürten, Jens 455  
 Kyllingsbæk, Søren 123

## L

Lachmann, Thomas 262, 391, 430  
 Ladwig, Stefan 456

Landerl, Karin 107  
 Landmann, Eva 457  
 Landmann, Helen 403  
 Landwehr, Jan R. 158  
 Lange, Elke 302  
 Langenstein, Sonja 373  
 Langner, Robert 285, 458  
 Langsdorf, Leif 517  
 Langsdorf, Leif E. 324  
 Langsdorf, Leif Erik 459  
 Langus, Alan 110  
 Laparle, Schuyler 128  
 Lappe, Markus 347  
 Larrouy-Maestri, Pauline 345, 365  
 Laub, Ruth 329  
 Lavan, Nadine 82  
 Lavric, Aureliu 529  
 Laybourn, Sara 460  
 Lee, Xin Ying 147  
 Lê-Hoa Võ, Melissa 341, 466  
 Leidner, Daniel 488  
 Leipold, Franziska M. 170  
 Leisge, Kai 303  
 Lenggenhager, Bigna 404  
 Lenk, Larissa 541  
 Lepauvre, Alex 303  
 Lerche, Veronika 305  
 Lerner, Eva 298  
 Leuthold, Hartmut 159, 377, 473  
 Li, Amy X. 453  
 Li, Bing 222  
 Li, Wan 349  
 Liedtke, Nina 184, 461  
 Liepelt, Roman 159, 333, 526  
 Liesefeld, Heinrich 165, 167, 462  
 Liesefeld, Heinrich R. 480  
 Lietz, Gina 185  
 Lin, Yu-Shiuan 96  
 Lindenmann, Andreas 197  
 Linka, Marcel 258  
 Linke, Linda 462  
 Linnell, Josie 306  
 Lipnevich, Anastasiya A. 506  
 Liss, Julia V. 305  
 Liu, Huaiyu 306

Löffler, Christoph 199  
 Logvinenko, Tatiana 414  
 Lonsdorf, Tina B. 141  
 Lorenz, Megan G 106  
 Lu, Chunming 554  
 Lück, Inga 249  
 Ludwig, Karin 247, 307  
 Ludwig, Vera 214  
 Luna, Fernando G. 432  
 Luo, Jianliang 463  
 Lupyan, Gary 139  
 Lüthgen, Anjuscha 464  
 Lutz, Nicolas D. 201

## M

M. Giorjani, Giuliana 75  
 Macha, Anna-Maria 503  
 MacInnes, Joe 118  
 Mack, Wolfgang 125, 527  
 Mackenzie, Ian 53  
 Mackenzie, Ian G. 159  
 Mackenzie, Ian Grant 377, 473  
 Maess, Burkhard 240  
 Magdalena Abel 30  
 Maithani, Vidisha 465  
 Malejka, Simone 185  
 Mamassian, Pascal 246  
 Mancinelli, Federico 306  
 Mandal, Ananya 165, 167, 460  
 Manfredi, Lucia 211  
 Männel, Claudia 98  
 Manolika, Maria 466  
 Marcel R. Schreiner 28  
 marelli, marco 101  
 Marelli, Marco 99  
 Maren Mayer 24  
 Marimon, Mireia 110  
 Markov, Yuri 466  
 Marsella, Stacy 127, 129  
 Martin H., Fischer 400  
 Martin, Rainer 230  
 Martini, Anna 189  
 Mata, André 470

Mata, Rui 48, 49  
 Mathey, Stéphanie 111  
 Mathôt, Sebastiaan 336  
 Mattes, André 467  
 Matthäus Rudolph 38  
 Matthiesen, Sven 197  
 Matute, Helena 91  
 Maurelli, Francesco 221  
 Maurer, Daniel 468  
 Mauß, Noah 402  
 Mayer, Maren 45  
 Mayr, Susanne 310, 469  
 McCaughey, Linda 308  
 Mcdonald, Craig G. 102  
 McEllin, Luke 309  
 McMahon, Jenny 150  
 Meer, Yael 175  
 Melloni, Lucia 252, 254, 303, 350, 534, 553  
 Memmert, Daniel 134  
 Mendl, Jonathan 309  
 Mendonça, Cristina 470  
 Menn, Katharina 98  
 Merrill, Julia 69  
 Mertens, Samuel 577  
 Merz, Simon 332, 470  
 Metzger, Luise 471  
 Meyen, Sascha 144, 375, 412  
 Meyer, Lars 98  
 Meyer, Laura 540  
 Meyer-Grant, Constantin 494  
 Meyerhoff, Hauke 470  
 Michael, Lars 472  
 Michaelsen, Talke 462  
 Michalareas, Georgios 277  
 Miller, Jeff 162  
 Min, Ji-Young 472  
 Minato, Takashi 508  
 Miny, Torben 349  
 Miriam Gade 24  
 Mitra, Ava 504  
 Mitschke, Vanessa 578  
 Mittelstädt, Victor 159, 377, 473  
 Mitterer, Holger 474  
 Mminele, Katharina 305  
 Mocke, Viola 195, 396, 533

Moeller, Birte 192, 271, 329, 396, 482  
 Mohanathasan, Chinthusa 229  
 Mojzisch, Andreas 272, 376, 475  
 Moll, Kristina 108  
 Möller, Malte 310, 469  
 Montoro, Pedro R. 359  
 Moore, Roger 219  
 Moretti, Luca 85, 323  
 Morgenroth, Olaf 475, 498  
 Moritz Ingendahl 33, 36  
 Mořaryn, Jakub 218  
 Mueller, Ilka 215  
 Mueller, Jutta L. 206  
 Mueller, Ronja 297  
 Mühlbauer, Barbara 476  
 Mühlberger, Andreas 232, 514  
 Müller Karoza, Lea 311  
 Müller, Hermann 166, 168, 223, 225, 226, 227  
 Müller, Romy 477, 513  
 Munar, Enric 70  
 Mundi, Sibü 251  
 Muniak, Pawel 60  
 Münster, Nicolas 478  
 Münzberg, Jan 134  
 Münzer, Stefan 383  
 Muralikrishnan, R. 481  
 Murdison, Scott 276  
 Murovec, Brandy 372  
 Musfeld, Philipp 202

## N

Naber, Marnix 336  
 Nachtnebel, Sarah Jasmin 478  
 Nadarevic, Lena 180  
 Naefgen, Christoph 403, 479  
 Nan, Yun 80  
 Narciso, Sofia 470  
 Narraway, Thomas 480  
 Navarro-Baéz, Sofia 15, 20  
 Navarro-Báez, Sofia 169  
 Nazir, Tatjana 222  
 Neamaalkassis, Hakam 481  
 Nemeth, Maria 482

Neubauer, Andreas 208, 209  
 Neubauer, Andreas B. 211  
 Neudek, Daniel 230  
 Ngiam, William 202  
 Nicholls, Victoria 234  
 Nickl, Anna 187  
 Nie, Maohua 312  
 Niese, Zachary 313  
 Nieznański, Marek 181  
 Nikolettä Symeonidou 28  
 Nikolovska, Kristina 221  
 Nizamoglu, Hilal 483  
 Nobre, Anna C. 453  
 Notebaert, Wim 161  
 Nowak, Andrzej 248  
 Nowak, Sandra 484  
 Nussberger, Anne-Marie 50  
 Nuthmann, Antje 484

## O

Oberauer, Klaus 485  
 Oberfeld-Twistel, Daniel 228, 427  
 Oberholzer, Yvonne 282  
 Obleser, Jonas 348  
 Oehl, Michael 376  
 Oguz, Sara 53  
 Ohl, Sven 79, 525, 586  
 Oliver Genschow 30  
 Olivier de Vries 41  
 Olschewski, Sebastian 55, 312  
 Önay, İlayda 293  
 Oomen, Danna 61  
 Oosterman, Joukje M. 346  
 Orenes, Isabel 54  
 Orphal, Lara 486  
 Orth, Finja 540  
 Ortlieb, Stefan 287, 487  
 Osenberg, Angela 564  
 Österdiekhoff, Annika 407  
 Ostrovsky, Tehilla 314  
 Oswald, Florian S. 390  
 Otten, Jürgen 231  
 Ovalle-Fresa, Rebecca 324, 505

Overath, Tobias 296  
 Özdemir, Sahcan 78, 327  
 Özkılıç, Yıldız 560  
 Öztürk, Sümeyye 534

## P

Pachur, Thorsten 15, 58, 314, 423  
 Pakai-Stecina, Diána 578  
 Palko-Arndt, Bernadett 71  
 Palminteri, Stefano 56  
 Papenmeier, Frank 416, 488  
 Parth, Fabian 489  
 Paschke, Lena M. 214  
 Paschmanns, Anna 315  
 Pastorelli, Concetta 211  
 Pastötter, Bernhard 271, 316  
 Pastukhov, Alexander 65  
 Pastukhov, Alexander (Sasha) 68  
 Pauli, Janos 205  
 Paulmann, Silke 83  
 Paulmann, Yvonne 14  
 Pauly, Marcel 490  
 Peiro-Lanchares, Carmen 491  
 Penacchio, Olivier 317  
 Pennycook, Gordon 471  
 Perez-Osorio, Jairo 16, 102  
 Peters, Benjamin 384  
 Peters, Tobias 492  
 Petersen, Anders 124  
 Petrasch, Aaron 318  
 Peuckmann, Lisa 268  
 Pfening, Natalia 408  
 Pfeuffer, Christina U. 197, 402, 540, 571, 587  
 Pfister, Roland 318, 396, 509  
 Philipp, Andrea M. 194, 422  
 Pieczykolan, Aleks 319  
 Pinheiro, Ana 82  
 Pinquart, Martin 486  
 Pitsch, Werner 303  
 Plueckebaum, Hannah 217  
 Pochwatko, Grzegorz 218  
 Poeppel, David 277  
 Pohl, Jan 221

Polgári, Patrik 493  
 Pollak, Katja 494  
 Pope, Marianna 115  
 Popov, Tzvetan 404  
 Porta-García, Miguel 497  
 Portele, Yvonne 13, 52  
 Poth, Christian H. 120, 355, 447  
 Potinteu, Andreea E. 488  
 Pounder, Zoë 239  
 Prantl, Katrin 402  
 Prasad, Seema 320  
 Prehn, Kristin 495  
 Prieto, Antonio 359  
 Prochnow, Astrid 95  
 Pruessner, Luise 215  
 Pulm, Claudine 148, 156

## Q

Qin, Xiquan 554

## R

R. Reeder, Reshanne 239  
 Raab, Florian 368  
 Raab, Marius 487  
 Raab, Markus 131, 400  
 Raab, Mia 112  
 Rabe, Maximilian 123  
 Rademaker, Rosanne 356, 449, 523, 561  
 Rademaker, Rosanne L. 75, 496  
 Radev, Stefan 418  
 Radev, Stefan T. 343  
 Radovic, Tara 321  
 Radüntz, Thea 398  
 Ramscar, Michael 135  
 Ramsey, Richard 66  
 Rawal, Amit 496  
 Rebholz, Tobias R. 44, 45  
 Redepenning, Tim 497  
 Reeder, Reshanne R. 454  
 Reichensperger, Julia 475, 498  
 Reichert, Lukas 131, 134  
 Reichmann, Kathrin 152, 157

Reinarz, Anne 479  
 Reinhartz, Alice 499  
 Reis, Florian 321  
 Reis, Moritz 321, 517  
 Render, Anna 310, 469  
 Rengiiyiler, Sezer 500  
 Rettore Micheli, Leticia 331  
 Reutter, Mario 339  
 Rey-Mermet, Alodie 84, 86, 87, 505  
 Riascos-Salas, Jaime A 579  
 Richter, Anni 259  
 Richter, Jasmin 148, 192  
 Richter, Thomas 160, 163  
 Richthofer, Stefanie Christina 580  
 Riddell, Hugh 347  
 Rieskamp, Jörg 312  
 Rimmele, Johanna 574  
 Ringer, Hanna 322  
 Robert, Christelle 111  
 Rock, Amelia G. 453  
 Roembke, Tanja 106  
 Roembke, Tanja C 323  
 Roembke, Tanja C. 21  
 Röer, Jan Philipp 355, 504, 580, 583  
 Rohr, Michaela 145, 268, 279  
 Roig, Gemma 236, 547  
 Rolf Ulrich 35  
 Rolfs, Martin 429, 525, 586  
 Rolison, Jonathan 314  
 Rolke, Bettina 420, 458, 501  
 Rommerskirchen, Lena 502  
 Rösch, Anne 52  
 Röseler, Lukas 44  
 Rosner, Agnes 282  
 Roßkopf, Sarah 232  
 Rössler, Roland 555  
 Rothen, Nicolas 301, 324, 505  
 Rothermund, Klaus 152, 188, 189, 190, 263  
 Rothkirch, Marcus 503  
 Różańska-Walczyk, Monika 218  
 Rudolph, Matthäus 188, 189  
 Ruge, Hannes 88  
 Rummel, Jan 301, 414, 421  
 Rummer, Ralf 452  
 Rumpel, Simon 264, 522

Rußwinkel, Nele 407  
 Ryan Hackländer 30

## S

Saad, Laura 90  
 Saalwirth, Christina 505  
 Sabo, Melinda 327  
 Sachdeva, Chhavi 301, 324, 505  
 Sachs, David F. 506  
 Sadeghi Talarposhti, Maryam 324  
 Sadeghi, Maryam 459  
 Sadipour, Esmaeil 507  
 Sadipour, Faezeh 507  
 Sadus, Kathrin 199, 421  
*Sahcan Özdemir* 34  
 Said, Nadia 237, 250, 325, 416  
 Sakata, Chifumi 508  
 Sammler, Daniela 80, 240, 296, 440  
 Sanwald, Simon 581  
 Sapir, Ayelet 283  
 Sapronov, Frol 582  
 Sarlak, Tina 439  
 Sauseng, Paul 125  
 Sauter, Marian 114, 270, 410, 527  
 Scarf, Damian 206  
 Schaaf, Mirijam 210  
 Schaaf, Moritz 509, 533  
 Schacht, Anne 578  
 Schack, Thomas 405  
 Schaefer, Sabine 303, 326, 419, 433  
 Schaefer, Simon 509  
 Schäfer, Julian Konstantin 423  
 Schaper, Marie Luisa 172  
 Scharf, Florian 98  
 Scharlau, Ingrid 125, 492  
 Schaumburg, Keno 545  
 Scheibehenne, Benjamin 55  
 Schenk, Thomas 247, 307, 512, 519, 564, 584  
 Schicker, Lucie A. 178  
 Schils, Ludivine 510  
 Schlegelmilch, René 59  
 Schlittmeier, Sabine 18, 349  
 Schlittmeier, Sabine J. 229, 415

- Schlittmeier, Sabine J. 251  
 Schlüter, Helge 183  
 Schmalbrock, Philip 421, 511  
 Schmalz, Xenia 21, 108  
 Schmid, Doris 512  
 Schmidt, James 190  
 Schmidt, Judith 513  
 Schmidt, Teresa 514  
 Schmidt, Thomas 147  
 Schmidt-Kassow, Maren 14, 81  
 Schmiedek, Florian 208, 209, 211  
 Schneider, Daniel 78, 280, 327, 571  
 Schneider, Iris 398  
 Schneider, Nicola 328  
 Schneider, Werner X. 120, 355  
 Schnellen, Ronja 292, 582  
 Schnuerch, Martin 170, 552  
 Schoeberl, Tobias 515  
 Scholten, Florian 46  
 Scholz, Annemarie 328  
 Schommartz, Iryna 236, 393  
 Schönfelder, Sandra 213  
 Schönfeldt-Lecuona, Carlos 443  
 Schönung, Désirée N. 170  
 Schöpper, Lars-Michael 271, 329, 342  
 Schreiber, Anton 302  
 Schreiner, Marcel 196  
 Schreiner, Marcel R. 23  
 Schreiner, Marcel R. 195  
 Schroeder, Philipp 383  
 Schroeger, Anna 516  
 Schubert, Anna-Lena 87, 199, 280, 509  
 Schubert, Paula 472  
 Schubert, Torsten 257, 321, 324, 455, 459, 517  
 Schubö, Anna 112  
 Schubotz, Ricarda 184  
 Schubotz, Ricarda I. 461  
 Schulte-Körne, Gerd 108  
 Schultze, Martin 357, 373  
 Schultze, Thomas 43  
 Schulz, Jean-Luca 344  
 Schulz, Luisa 177  
 Schulze, Katrin 215  
 Schulz-Hardt, Stefan 44  
 Schumacher, Lukas 530  
 Schütt, Emanuel 53, 520  
 Schütz, Alexander C. 244, 246, 330, 489, 493  
 Schütz, Christoph 497, 524  
 Schütz-Bosbach, Simone 291, 406, 407  
 Schutze, Thomas 272  
 Schwarz, Katharina 517  
 Schwarz, Mira 518, 537  
 Schwarzacher, Franz-Peter 519  
 Schwarzer, Gudrun 362, 464, 535, 570  
 Schweinberger, Stefan R. 450  
 Scriba, Carl 439  
 Sebanz, Natalie 309, 344  
 Seeligmüller, Emily 583  
 Seibold, Verena 458  
 Seibold, Verena Carola 521  
 Seiler, Johannes P.-H. 264, 522  
 Seitz, Werner 164  
 Şengül, Beril Sercem 353  
 Serratos, Ulises 140  
 Servetnik, Maria 523  
 Seubert, Olivia 331  
 Sewell, David 344  
 Shakoor, Sabrina 178  
 Shalev, Nir 121  
 Shen, Zixin 524  
 Shi, Zhuanghua 166, 168  
 Shing, Yee Lee 236, 393, 446  
 Simon, Joe J. 502  
 Simonetti, Matilde Ellen 106  
 Singh, Dipti 332  
 Singh, Tarini 525  
 Sinn, Rasmus 207  
 Sinning, Annkathrin 349  
 Sivri, Elif 360  
 Skelin, Ivan 254  
 Skunde, Mandy 502  
 Smith, Parker 51, 520  
 Soballa, Paula 332  
 Sommer, Aldo 333  
 Sommer, Ben 525  
 Song, Yuze 334  
 Sonntag, Samuel 53  
 Sørensen, Thomas Alrik 119  
 Soyka, Stella J. 251  
 Söylemez, Sinem 337

Spaniol, Julia 372  
Spannowsky, Nadja 521  
Spektor, Mikhail 57  
Spence, Charles 470  
Speranza, Andrea 54  
Sperl, Laura 526  
Sperlich, Lea 156  
Stahl, Christoph 154, 548  
Stahl, Jutta 467  
Standtke, Joelin-Sofie 257  
Stankovic, Milos 166  
Stärz, Felix 232  
Stecher, Rico 395  
Stefani, Maximilian 505, 527  
Steimke, Rosa 214  
Stein, Isabel 427  
Steindel, Sophia Marie 102  
Steiner, Anna 107  
Steinhof, Verena 526  
Stelzel, Christine 214  
Stenner, Max-Philipp 259, 454  
Stephan, Denise 223, 225, 510  
Stephan, Denise N. 227  
Stodt, Benjamin 230  
Stoinski, Laura 530  
Stolte, Moritz 410  
Strahler, Jana 494  
Straub, Elisa 223, 225, 435, 555  
Straub, Elisa R. 227  
Straube, Lotta 335  
Strauch, Christoph 286, 336, 388  
Streitberger, Carolin 336  
Strelow, Frederike Hanna 528  
Strivens, Amy 529  
Strobach, Tilo 297, 438, 499  
Stump, Annika 530  
Styrnal, Malin 530, 562  
Suchotzki, Kristina 450, 549  
Suero Suñé, Manuel 118  
Surer, Elif 404  
Sweeney, Carolin 536  
Sweldens, Steven 152, 153  
Symeonidou, Nikoletta 174, 198  
Szillat, Linus 412

## T

Tack, Daria 52  
Tagu, Jérôme 111  
Talaga, Szymon 248  
Tambwé, Ella 475  
Tappert, Anika 220  
Taskiran, Didem 584  
Tasliyurt-Celebi, Sule 338  
Taubner, Svenja 588  
Tavacioglu, Ebru Ecem 339  
Tavano, Alessandro 340, 424, 481, 576  
Tavera, Felice 531  
Taylor, Emily 267  
Taylor, Jack E. 207  
Tena Garcia, Yanina Elise 532  
Thoma, Anna 48  
Thomas Jacobsen 34, 37  
Thornton, Ian M. 113, 504  
Timm, Irina 209  
Tkhan Tin Le, Sofia 118  
Tobias R. Rebholz 24  
Toda, Rizu 242  
Tomazin, Ligia 506  
Toneva, Mariya 235  
Tonn, Solveig 509, 533  
Topp, Yannic 344  
Toraman, Buse Nur 337  
Török, Georgina 344  
Treffenstädt, Christian 44  
Treitinger, Kathrin 340  
Treue, Stefan 515  
Triesch, Jochen 233  
Trübutschek, Darinka 534, 553  
Truebutschek, Darinka 350  
Tsenkova, Nikol 535  
Tsetsos, Konstantinos 55  
Tufft, Miles 536  
Tunçel Lieflander, Zeynep 585  
Tünnermann, Jan 17, 112  
Tünnermann, Jan 13  
Türk, Dilara Deniz 341  
Türkan, Nilay 342  
Tüscher, Oliver 522



## U

Ufken, Emily 67  
 Ülker, Oktay 182  
 Ullén, Fredrik 574  
 Ullsperger, Markus 249  
 Ulrich, Rolf 138, 163, 436  
 Ulrike Basten 32  
 Undorf, Monika 169, 175, 176, 177, 379  
 Unkelbach, Christian 156  
 Ünver-Aydingül, Nursima 561

## V

Vadillo, Miguel 569  
 Valiante, Taufik 254  
 van de Par, Steven 232  
 Van de Walle, Marie 161  
 Van der Stichel, Stefan 286  
 Van der Stigchel, Stefan 336  
 van Zantwijk, Laura 586  
 Van Zantwijk, Laura 336  
 Vangkilde, Signe 124  
 Vartanian, Meghedi 253  
 Venkataramani, Varun 251  
 Vieweg, Janine 419  
 Villota, Hernan 579  
 Vő, Melissa 234, 243, 292, 311  
 Vő, Melissa L.-H. 369  
 Vő, Melissa Lê-Hoa 582  
 Vogel, Tobias 149, 155, 541  
 Vollrath, Mark 442, 451, 528  
 von Bastian, Claudia 85  
 von Bastian, Claudia C. 499  
 von Castell, Christoph 536  
 von Dawans, Bernadette 316  
 von Helversen, Bettina 59, 256, 426  
 von Krause, Mischa 343, 418, 437  
 Voormann, Anne 162, 197  
 Vormittag, Sabrina 537  
 Voss, Andreas 305, 328, 418, 437, 530  
 Voudouris, Dimitris 516

## W

Wachten, Hanna 494  
 Wächtershäuser, Tabea 549  
 Wagner, Ilya 276  
 Wagner, Tobias 410  
 Wagner, Ullrich 554  
 Wahl, Hanna Estelle 414  
 Wahn, Basil 16, 105, 273  
 Wald-Fuhrmann, Melanie 302, 365  
 Walsh, Vincent 253  
 Walter, Henrik 214  
 Walter, Sebastian 448  
 Walther, Eva 525  
 Wang, Jiashun 538  
 Wang, Keyang 539  
 Wang, Xin 539  
 Wappes, Melina 540  
 Ward, Jamie 505  
 Weber, Bernhard 488  
 Weber, Florian 541  
 Wechsler, Theresa Friedericke 514  
 Weckop, Sophia 266  
 Wegner, Thomas G.G. 247  
 Weicker, Merle 53  
 Weigand, Anne 503  
 Weigelt, Matthias 132, 133, 344  
 Weinert, Daniel 167  
 Weis, Patrick 541  
 Weiß, Thomas 189  
 Wendel Heinrich, Nils 407  
 Wendt, Charlott 146  
 Wendt, Mike 438, 475, 495, 498, 542, 558  
 Wenke, Dorit 435, 543  
 Wentura, Dirk 145, 268, 279, 411, 490  
 Wenzel, Lisa 544  
 Werner, Deborah 540, 571, 587  
 Werner, Juliane 545  
 Wernicke, Martina 546  
 Wessa, Michèle 213  
 West, Rebecca K 344  
 Wester, Janniek 345  
 Westfal, Mareike 62  
 Wetzel, Nicole 259

Weyers, Ivonne 206  
 Whelan, Emily 505  
 Wichmann, Felix 476  
 Wick, Wolfgang 251  
 Wickemeyer, Carolin 133  
 Widmann, Andreas 259  
 Widmann, Eva 520  
 Widmayer, Lea 234  
 Wiebel-Herboth, Christiane 363  
 Wiebers, Emily 547  
 Wiegand, Iris 13, 17, 115, 346  
 Wieland, Björn 131, 134  
 Wieland, Lena M. 208  
 Wiese, Eva 16, 102, 105, 267, 273  
 Wiesmann, Sandro L. 369  
 Wilbrink, Marc 376  
 Wills, Andy 59  
 Wilts, Sarah 548  
 Windmann, Sabine 357, 373  
 Wingen, Tobias 62  
 Winkler, Maximilian 534  
 Winter, Bodo 278  
 Wirth, Robert 347  
 Wittmann, Marc 404  
 Wögerbauer, Elisabeth 550  
 Wöhner, Stefan 431  
 Wolf, Christian 347  
 Wolfe, Jeremy 7, 117  
 Wolfe, Jeremy M. 504, 583  
 Wolkersdorfer, Maximilian 147  
 Woloszyn, Hanna 97, 98  
 Wonnacott, Elizabeth 135  
 Wöstmann, Malte 348  
 Wu, Di 73  
 Wühr, Peter 134  
 Wulff, Dirk 47, 48, 49, 57  
 Wünsch, Miriam 460, 472, 506  
 Würger, Sophie 349

## Y

Yaban Yalcin, E. Helin 403  
 Yalçın, Melek Öyküm 550  
 Yang, Shu 551  
 Yazdi, Sina H.N. 253  
 Yee Lee Shing 38  
 Yılmaz, Münevver 337  
 Yüvrük, Elif 293, 358, 434

## Z

Zaborowska, Oliwia 174  
 Zagel, Christian 335  
 Zajdler, Selina 552  
 Zawadzka, Katarzyna 171, 174, 484  
 Zeng, Qiyuan 553  
 Zentgraf, Karen 131, 134  
 Zhang, Bei 166  
 Zhang, Huan 554  
 Zhang, Mingmin 76  
 Zhao, Feifei 350  
 Zheng, Zefan 350  
 Zhou, Guanghou 588  
 Zhou, Haoyu 109  
 Zhou, Tian 555  
 Zhou, Yuefang 220  
 Zhuang, Ran 556  
 Ziegler, Johannes 308, 351  
 Ziegler, Johannes C. 206  
 Zier, Anna 557  
 Zimmer, Ulrike 475, 558  
 Zimprich, Daniel 423, 544  
 Zinchenko, Artyom 165, 167  
 Zipper, Vincent 513  
 Zuffianò, Antonio 211  
 Zühlke, Rica 170

# Thank you

## #TeaP2025

67<sup>th</sup> Conference of Experimental Psychologists

# for being part



MAX PLANCK INSTITUTE  
FOR EMPIRICAL AESTHETICS

