Abstracts of the 64th TeaP

Tagung experimentell arbeitender Psycholog:innen/
Conference of Experimental Psychologists

Edited by Simone Malejka, Marius Barth, Hilde Haider, and Christoph Stahl

University of Cologne

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March 20 to 23, 2022

Cologne, Germany

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Preface

A very warm welcome to the 64th Conference of Experimental Psychologists – in German *Tagung experimentell arbeitender Psycholog:innen*, or in short TeaP!

We are delighted to host this inspiring event for the first time at the University of Cologne. Since the first TeaP conference in Marburg in 1959, the conference has grown steadily and transformed to what is today one of the largest conferences for experimental psychologists in German-speaking countries. Moreover, since the introduction of English as the conference language in Mannheim in 2012, the large number of contributions from all over the world confirms that the TeaP conference has outgrown its former character as a regional meeting.

Back in early 2020, when the Covid-19 pandemic hit (and forced the TeaP conference in Jena to be canceled), we were still hoping for an in-person meeting in 2022. Unfortunately, the new wave prompted us to switch to a fully virtual format in January. But then the Cologne optimism kicked it: Et hätt noch emmer joot jejange – It will always work out well. With this in mind, we put all of our efforts into planning an online event that resembles an in-person meeting as closely as possible (e.g., live sessions, social events, virtual meeting spaces). Now we are thrilled that the time has come, and there are several reasons why we did not want to wait any longer.

We are excited to have attracted three eminent colleagues as keynote speakers. On Monday, Liad Mudrik (Tel Aviv University) will introduce us into the discussion of the most important questions in psychology: the nature of consciousness and the existence of free will. On Tuesday, Candice Morey (Cardiff University) will talk about the unsolved question of why verbal information is more robustly represented in working memory than any other information. On Wednesday, Eliot Hazeltine (University of Iowa) will present recent findings in action control and multi-tasking.

We were also stunned by the numerous submissions: The conference has no less than 701 contributions (3 keynote lectures, 42 symposia, 455 talks, 172 posters, and 29 no-data posters), 5 pre-conference workshops, and 3 lunch sessions. When reviewing the submitted abstracts, we were impressed by the high quality of the contributions and the range of topics that were covered. The submissions were predominantly experimental in nature and make substantial contributions to the development and modification of psychological models and theories; they also cover a broad range of approaches from basic neuroscience to applied domains; and several contributions impressively show how experimental psychological science can help to address current challenges for our societies such as climate change, inequality, human-machine interaction, social communication, or conflict resolution.

Finally, we wish to express our sincere gratitude to the keynote speakers, the instructors of the pre-conference workshops, the hosts of the career-planning lunch sessions, and the experts of the no-data poster session sharing their knowledge with the next generation of experimental psychologists. Further thanks go to the *Fachgruppe Allgemeine Psychologie*

(Cognitive Psychology Section) of the German Psychological Society (DGPs) for their support. Last but not least, we would like to thank the team of reviewers and the team of volunteers for their hard work over the last few months. Without you, this event would not have been possible.

We wish all speakers and attendees productive, inspiring, and enjoyable virtual days in Cologne!

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Contents

Keynotes

Empirically studying seemingly non-empirical questions: A plea for a neuroscientific-philosophical approach

Liad Mudrik
Tel Aviv University

For centuries, questions about the nature of consciousness or the existence of free will were considered outside the realm of scientific investigation. Yet in recent decades, studies in neuroscience and cognitive science have taken a stab at these questions, giving rise to new empirical findings and novel theories. In this talk, I will describe three attempts to translate these long-lasting philosophical questions into empirically testable ones, regarding the role of consciousness in voluntary action, the relations between conscious experience and neural activity, and the possible dissociation between phenomenal consciousness and access consciousness. I will further highlight some of the challenges entailed in such works, and suggest that our understanding of these highly complex and intricate phenomena can substantially benefit from a multidisciplinary dialogue, tying together experimentalists and philosophers.

Something to talk about: Why is verbal information so much more resistant to distraction than visual information?

Candice Morey
Cardiff University

All information is not equal in memory. Immediate memory for novel visual information is very restricted. What little we do retain from a scene is disrupted by a variety of things, even stimuli quite different from the imagery we are attempting to remember. In contrast, verbal information is quite robust. Currently, models of working memory do not adequately capture this disparity. I will argue that this asymmetry is best explained by how precisely preparation of a response maps onto the information remembered. Speech preserves verbal details with high fidelity, whereas the responses used to indicate memory for visual imagery communicate comparatively little. Speech could therefore be seen as a "hack" that can be deployed to enhance our very limited, general immediate memory capacity when words are what we need to remember. I will consider how this should influence working memory theory and its application.

Adding sensory consequences to actions can reduce switching and dual-task costs

Eliot Hazeltine
University of Iowa

Considerable evidence indicates that selecting a response entails anticipating its sensory consequences. If actions are represented partly by their anticipated consequences, then these consequences may provide a source of the interactions between responses produced closely together in time. I will discuss two widely studied forms of interactions between

temporally proximal responses: task-switch costs and dual-task costs. In both cases, adding sensory consequences changes the pattern of costs even though the sensory consequences occur after the responses are produced. The change in the costs depends on relationships among the consequences and the stimuli and responses both within and between tasks. These findings show that changes in the consequences of responses affect their representations and challenge the viability of stimulus-response associations as the drivers of voluntary behavior.

Symposia

Acceptance of artificial intelligence producing natural language

Kai Sassenberg
Knowledge Media Research Center (IWM)

In recent years, artificial intelligence (AI) has rapidly entered people's everyday live. More and more written and even spoken natural language is produced by AI-based systems such as conversational AIs (e.g., Siri, Alexa), or bots for instance in consumer interaction. Given their growing prevalence, it is important to understand whether the aversion against algorithmic decision-making that has been found in earlier research generalizes to AIs producing natural language. This symposium features experimental research on three questions related to the acceptance of language produced by AIs. First, Talk 1 by Gunser et al. answers the question whether lay people can differentiate texts that are written by humans from those written by an AI (here in case of poetry). Second, Talks 2 and 3 target the question of whether the same text is more accepted when it has ostensibly been produced by a human being versus an AI. Klein et al. (Talk 2) studied social interaction in a chat, whereas Lermann Henestrosa et al. (Talk 3) examined science communication. The final two talks focus on the question of whether special features of AI-based communication contribute to its acceptance. Gaiser et al. (Talk 4) tested the effect of modality (text vs. spoken language) and Gieselmann et al. (Talk 5) studied the impact of competencies ascribed to conversational AIs on their acceptance. Across presentations, results indicate that lay people are able to differentiate between human- and AI-based texts. When one and the same text is presented as human- vs. AI-generated, the acceptance of the text is not influenced by the information about the source. However, specific features of AI such as modality and (ascribed) competencies influence acceptance.

Advances in TVA-based visual attention research: Progress toward new stimuli, tasks, and data

Jan Tünnermann[1] & Ingrid Scharlau[2]
[1]*University of Marburg,* [2]*Paderborn University*

The Theory of Visual Attention (TVA) understands visual perception as a competition in which visual categorizations compete for encoding into visual short-term memory, biased by attentional and perceptual parameters. With its mathematical framework, TVA formalizes this process rigorously, linking data to theoretical concepts. A trend that has now lasted several years is that some TVA research is moving toward new and more complex stimuli, tasks, and data. Continuing our last-year symposium on this development, we discuss work on how TVA can be applied to a broad range of experimental data and situations: Banh and Scharlau report effects of negation in instructions on visual attention and show how TVA can help to understand the processing of negation. While TVA has already been applied to study the effects of visual salience on attentional processing in the past, social salience effects have not been studied with TVA so far. Scheller et al. present recent work that studies such effects (salience induced by self-association) with TVA. The influence of eye and hand movements on TVA parameters is in the focus of Kreyenmeier et al.'s work. Kristjánsson and Tagu investigate the benefits of the visual-foraging tasks for

assessing the flexibility of attentional control in continuous behavioral situations. Tünnermann and Schubö connect to this with a study of the dynamics of attentional-template switching in visual foraging with the help of TVA-based simulations. A novel extension of TVA for including reaction time data in TVA analyses is presented by Blurton et al.

Akzeptanz automatisierter Fahrzeuge

Mark Vollrath
Technical University of Braunschweig

Zukünftige automatisierte Fahrzeuge werden sich noch lange Zeit im Mischverkehr mit menschlichen Verkehrsteilnehmern (andere Autofahrer, Fußgänger und Radfahrer) aufhalten und mit diesen interagieren. Für die Akzeptanz der Fahrzeuge und damit deren Gebrauch bzw. Kauf ist wichtig, dass sich einerseits die Insassen dieser Fahrzeuge (als Passagiere), andererseits die anderen menschlichen Verkehrsteilnehmer bei diesen Interaktionen und dem speziellen Verhalten der automatisierten Fahrzeuge wohl und sicher fühlen. In diesem Symposium werden Ansätze und Ergebnisse zu diesem Problemkreis diskutiert, um so zu einer menschzentrierten Entwicklung der Automation beizutragen. Von der psychologischen Seite her geht es um ein besseres Verständnis davon, welches Verhalten in Interaktionen im Verkehr angenehm und angemessen erscheint.

An interdisciplinary view on trust processes in human-technology interaction

Johannes Kraus[1] & David Scholz[2]
[1]*Ulm University,* [2]*University of Koblenz and Landau*

Trust as a subjective prerequisite for interpersonal reliance has gained importance in the application to the interaction with technology in various fields (e.g., AI-based diagnostic, automated driving, human-robot interaction). The goal of this symposium is bringing together researchers from different psychological domains investigating trust processes in technology interaction. With this, we hope to initiate a fruitful discussion to enhance communication and consensus in theorizing and methods in different fields of applied psychological trust research. The first talk of Kraus introduces the Three Stages of Trust framework as a psychological framework for experimentally investigating trust in the interaction with technological systems. The second talk of Scholz et al. introduces a validation study of a propensity to trust scale along with implications for experimental trust in technology research. The third talk of Schlicker et al. presents a study in which the role of prior experience and explanation styles on trust in automated decision making. The fourth talk of Langer et al. presents a study in which formation and calibration of trust in human- vs. technology-based personnel selection over time were compared. The fifth talk of Sondern et al. summarize an experiment in which the effects of a human and an AI in job negotiations on trust were compared. In the sixth talk of Heinrich et al. an online study is presented, which indicated higher trust levels for a cooperative vs. non-cooperative driving automation and a conservative automated driving style. Taken together, the six talks present interdisciplinary work on the role

of psychological processes involved in formation and calibration of technology trust and compare human-human and human-technology trust.

Basal and early cognition – thinking with no or little brain

Jannes Freiberg & Julian Keil
Kiel University

Recently the scope of cognition research has broadened. In addition to the focus on the complex mammalian brains, mental faculties of life have been studied from molecules over unicellular organisms and plants to simple nervous systems. Findings in all these groups suggest that behavioral flexibility, memory and cognition are not exclusive to complex brains, but instead can be found in a multitude of organisms with simple nervous systems and those without neurons. This suggests that many cognitive adaptations may have evolved convergently in unrelated species, making cognition a trait of life itself. Here we report studies performed at Kiel University on cognition in flatworms and plants. These were conducted to investigate which cognitive traits may be similar to many forms of life. In flatworms, we can show that one of the earliest brains in evolution is capable of learning and may exhibit universal features of more complex animals like lateralization and ongoing neural oscillations in the EEG signal. Furthermore, we suggest that very different structures from another evolutionary pathway may achieve a comparable functionality to a nervous system. This is supported by two studies on plants, showing habituation and memory in two very different species.

Bayesian advances in cognitive modeling

Julia M. Haaf & Frederik Aust
University of Amsterdam

Bayesian modeling has become a popular tool to analyze data in cognitive psychology. One reason for this development are computational advances paired with more accessible software tools for statistical analysis. Despite these innovations, Bayesian modeling still comes with its challenges, and more innovation is needed to address them. Three areas of recent development that are highlighted in this symposium are modeling of hierarchical data, model comparison using Bayes factor, and the implementation of theory in Bayesian models using ordinal constraints. These three areas are highly relevant for experimental psychology where hierarchical data structures are common and studies are often designed to test competing hypotheses. In this symposium, we discuss recent technical and statistical developments relevant to experimental psychology, and highlight several applications including consciousness, recognition memory, cognitive inhibition, and creativity.

Beyond the switch: Using (voluntary) task switching to investigate psychological questions other than task switching per se

Kerstin Fröber[1] & Maayan Katzir[2]
[1]*University of Regensburg,* [2]*Bar Ilan University*

In this symposium, we gathered researchers who are using task switching, and the immense knowledge about its effects and indices, as a tool to investigate other psychological phenomena beyond task switching per se; processes such as goal-directed action, control adjustments, affect, motivation, memory, and trust. The first two talks focus on voluntary task switching, and find that flexible behavior can serve persistent goal pursuit (Talk 1), and that conflict in task switching biases decision making away from conflict due to its aversive nature (Talk 2). Talk 3 follows this logic more directly by explicitly investigating the affective nature of task switching and the consequences on effort-based decision making. Talks 4 and 5 use task switching to examine different aspects of performance. Talk 4 examines the conditions under which reward enhances performance, and the role flexibility and rigidity play in this context, and Talk 5 demonstrates that different types of cognitive control demands – switching vs. congruency – differentially influence memory by reducing and enhancing top-down attention, respectively. Finally, relying on indices within task switching paradigms such as the switch cost asymmetry, Talk 6 demonstrates that trust is a more dominant response tendency than mistrust.

Cognition in the context of language and culture I: Processing and representing linguistic information

Annelie Rothe-Wulf
University of Freiburg

Commonly, cognitive and perceptual processes are investigated independently from the specific linguistic, social or cultural context. The two-part symposium intends to close this gap by focusing upon the interplay of language and cognition and by exploring the variability of cognitive processes based on diverse cultural, social or linguistic systems. This first session focusses on the processes involved when we perceive, encode, and represent linguistic information. The experiment of Gerwien and Stutterheim thoughtfully scrutinizes the cognitive processes fundamental to verbal interference effects which are frequently used to investigate language-cognition interactions. In addition, Beck and Konieczny will shed light on the way we perceive and process language by examining the connection of eye-movements and rhythmic subvocalization during silent reading of rhymed language. Using saccadic and mouse tracking measures, Marberg et al. investigate top-down and bottom-up factors that moderate the patterns of attention allocation when generating gist. The final three talks will account for the impact of social, cultural and communicative contexts on cognition. Investigating adults and children in German or Arabic language contexts, Schlenter and Penke scrutinize the way animacy of noun words and the literacy of participants affect performance in a picture naming task. Feldmeth presents a series of four experiments that examine whether linguistically represented gen-

der characteristics influence perspective taking in the action-sentence compatibility effect paradigm. Finally, the study of temporal referencing representations of Herb and Rothe-Wulf intends to unravel linguistic influences on cognition by manipulating the specific language context and by scrutinizing variations in the dominant language.

Cognition in the context of language and culture II: Diversity across domains and human development

Annelie Rothe-Wulf
University of Freiburg

What factors of linguistic and cultural diversity might drive differences in cognitive processes? How does culturally and linguistically embedded cognition evolve during human development? What methods can we apply to tackle these questions across domains? The second part of the symposium attempts to catch a glimpse of possible research approaches across a variety of domains that are capable to respond to these questions. Kuhlen and Rahman introduce the shared picture-word interference paradigm for two participants that uncovers the influence of social interaction on language processing. Jurkat and Kärtner look at the role of language for the development of holistic vs. analytical attention styles in 4- to 9-year-old children, thus exploring two fundamental concepts of cross-cultural research. Investigating space-pitch associations of Turkish and Dutch children, Dolscheid et al. provide evidence for cross-cultural similarities in the acquisition of thickness-pitch associations, but variability for the development of height-pitch terminology. Considering the domains of space and time, Heer and Rothe-Wulf investigate to what extent temporal concepts of Aymara-Spanish speakers vary with changes in the linguistic contexts. In line with these findings, Dudojć and Bender show the prevalence of cultural diversity in finger counting systems highlighting the variability in numeral cognition and discussing the impact of finger counting habits and notational systems on cognitive number processing. Finally, the symposium concludes with the overarching talk of Straffon and Øhrn looking at the co-evolution of cognition and culture by investigating how human technologies evolved during human evolution and what cognitive capabilities are required for these accomplishments.

Conducting chronometric research online: Examples, tools, and best practices from language and eye tracking research

Anna K. Kuhlen[1] & Kirsten Stark[1,2]
[1]*Humboldt University of Berlin,* [2]*Charité – Universitätsmedizin Berlin*

In the wake of the pandemic, labs closed down and many researchers resorted to conducting their experiments online. Aside from supporting pandemic containment, online research comes with many other benefits compared to lab-based research, and is therefore likely to stay: Online studies promise greater efficiency in data collection, in particular when testing larger samples, and the possibility to reach out to a more heterogeneous subject population. In this symposium we will feature different approaches for running chronometric studies online. Our focus will be on best practice examples in fields that,

upon first sight, may not lend themselves easily to online solutions and have therefore only recently begun to explore these potentials. For example, experiments relying on very precise measurements of reaction times or eye movements, experiments requiring the recording (and analysis) of overt speech and its tight synchronization with visual stimulus presentation, experimental settings that enable or evoke the impression of being in a social interaction, or experiments targeting sensitive populations. Our speakers have each innovated unique and creative approaches to address these challenges and will present their approaches alongside different platform combinations, for example jsPsych, SoSci Survey, Gorilla, and JATOS.

"Denkpsychologie" today

Amory H. Danek
Heidelberg University

Classical psychology of thinking ("Denkpsychologie"), as for example represented by the Gestalt school, was later largely neglected, because of discontent with the often mere observational, anecdotal approach. Today, new methodological approaches have revived the study of insight problem solving and resulted in a surge of new studies. Hundred years after Köhler's chimpanzee observations on Tenerife, this has become an exciting area of research, with links to metacognition, memory, creativity and emotion. Research addressing the phenomenology of insight (Aha! experiences) has seen the most interest recently. This symposium brings together researchers from Norway, Belgium, Germany and the USA and represents a selection of contemporary efforts to understand human problem solving, with a focus on measuring feelings of insight. Topics to be discussed are the accuracy effect of insight (Danek), the unconscious nature of insight (Stuyck, Cleeremans, & Van den Bussche), the pleasure inherent in Gestalt detection (Muth), a developmental perspective on Aha! experiences (Haugen, Prenevost, Nilsen, & Reber), a neuronal mechanism for the insight memory effect (Becker), and fixation and mental set (Wiley).

Dynamic perception and action in virtual environments

Meaghan McManus & Immo Schütz
Giessen University

Historically, human perception and action research has been constrained by real world limitations in how stimuli can be presented and manipulated, and performance has typically been measured using button presses or restricted movements. Virtual reality (VR) is a powerful method to present naturalistic but highly controlled environments in a way not possible before. Using VR displays labs are now able to record continuous behavior from active participants. Technologies such as eye tracking or mobile EEG further enable collection of dynamic behavioral measures. This symposium discusses recent work on dynamic behavior that would have been difficult to study before VR. The first set of talks will highlight the importance of gaze in natural locomotion. Bremer will present work on predicting a person's movements through a virtual environment using gaze data and

Machine Learning, and Nolte will present a study on face perception and eye movements towards virtual pedestrians while participants explored a virtual city. The second set of talks focus on highly specific environments where VR can help to overcome some of the challenges faced when creating such unusual settings. Kopiske will discuss gaze-gait interactions while participants traversed a simulated slippery road surface, and Bury will present a study on how the perception of self-motion through a virtual hallway was affected during parabolic flight. The last set of talks use VR to manipulate how people interact with objects in their environment. Schuetz will show that free-hand pointing to objects in VR is attracted by an object's center of gravity, and McManus will present a study investigating predictive changes in tactile sensitivity while participants slice dynamic objects with a virtual "sword".

Experimental aesthetics I–III: Following Fechner's conceptions

Thomas Jacobsen
Helmut Schmidt University – University of the Federal Armed Forces Hamburg

The year 1876 marks the beginning of second-oldest branch of Experimental Psychology, namely Experimental Aesthetics. In his major work *Vorschule der Ästhetik*, Gustav Theodor Fechner suggested the empirical, experimental study of aesthetics "from below", applying empirical knowledge. To date, the psychology of aesthetics has been the subject of increasing interest. The present symposia comprise contributions investigating a variety of aesthetic domains including, inter alia, music, materials, and visual artworks. Furthermore, the researchers address questions of the influence of several stimuli's and individual's characteristics, for example, complexity and memory resources, respectively.

Experimental engineering psychology and human factors

Stefan Brandenburg[1] & Martin Baumann[2]
[1] *Technical University of Berlin,* [2] *Ulm University*

The facilitated integration of technology into people's lives highlights the importance of examining its impact on experience and behavior. Experimental approaches help to determine the underlying psychological processes of this impact. This symposium summarizes experimental studies examining various contexts of technology use and psychological aspects of Engineering Psychology and Human Factors. The first talk of Yuxuan Guo investigates whether people shift back and forth from ambient to focal processing based on internal triggers, such as the shift within and across the processing of tasks while no external event is given. The second talk of Matti Krueger addresses how technology can be designed to augment situation awareness, specifically in the context of traffic. Several prototypes and associated user studies are presented to demonstrate the utility of this approach. The third talk of Agnes Rosner describes an experimental study addressing memory retrieval processes in comprehension of dynamic traffic situations by using the so called looking-at-nothing phenomenon. The fourth talk of Tim Schrills describes a study in the field of Human-AI Interaction in Personalized Medicine. Here, the authors ran an experiment with diabetic patients assessing their subjective information processing

awareness. The fifth talk of Franziska Babel addresses a specific aspect of human-robot interaction: robot bullying. In an online experiment it was investigated which interaction patterns varying from friendly to severely bullying participants preferred when interacting with a robot in a goal conflict situation. The sixth talk of Thilo Kremer examines the impact of four contexts of technology use like online shopping on the importance ratings of 12 standardized user values.

Experimental validation of cognitive modeling

Nele Russwinkel[1], Jochem Rieger[2], & Marco Ragni[3]
[1]Technical University of Berlin, [2]University of Oldenburg, [3]University of Freiburg

Cognitive modeling is a core method to explain cognitive function and experimental results. In contrast to statistical analysis, it aims for identifying cognitive processes and their respective interplay and provide a functional explanation of observed data. In that sense cognitive models are executable psychological theories. They are tightly linked to psychological experimentation as they can be derived from and validated by psychological experiments. This symposium aims to focus on (i) real experimental data that can support/reject a model, (ii) features of cognitive models to be predictive, (iii) experimental validation methods and measures for cognitive models and similar aspects. The motivation of the symposium is to bring together experimental psychologists and cognitive modelers. We are open for any type of cognitive models and any form of experimental validation.

Face perception from laboratory to naturalistic contexts

Mario Reutter & Matthias Gamer
Julius Maximilian University of Würzburg

Humans are visual creatures. While other animals may recognize conspecifics by olfactory or auditory signals, humans mostly employ visual cues originating from the face. Having relied on this information for millennia, Homo sapiens has developed an outstanding capability to recognize and interpret faces under varying conditions. This ability has been studied for decades using still images, but recent technical developments provided novel approaches that are more immersive and interactive. In this symposium, different perspectives on face perception are highlighted, ranging from controlled laboratory settings to ecologically valid naturalistic contexts. First, we learn how 3D scanning of real faces enables a dissociation of texture and shape information in face recognition. Second, the impact of attentional deployment towards distinct facial features are discussed with respect to the phenomenon of fear generalization. Third, we look at reliable differences in social attention across visually rich images and their relation to social anxiety or alexithymia. Fourth, we shift focus to the interplay between self-focused attention and social anxiety during live video calls. Finally, gaze coordination in a real social interaction between parents and children is addressed by presenting data from a minimally invasive dual eye-tracking setup. Taken together, this symposium covers the broad spectrum from isolated face perception to social information processing in complex scenes and it integrates

findings on face recognition, social attention, and mechanisms of social interaction. This multi-angled approach, closely linked to the conceptual framework of cognitive ethology, is crucial to both accurately describe social phenomena and to identify the underlying processes.

Facets and determinants of pro- and antisocial behavior

Angela Dorrough & Dorothee Mischkowski
University of Cologne

Pro-social behavior is vital for the functioning of interpersonal relations, organizations, and societies at large. Correspondingly, the study of pro-social behavior and its counterpart – anti-social behavior – has gained considerable attention in all areas within psychology. In this symposium, we will bring together recent findings on different facets of prosocial behaviors and their determinants. Specifically, the symposium will present different facets of altruistic behavior (i.e., help-giving, moral courage, and peer punishment) as well as correlates of dispositional pro-sociality (i.e., benign and malicious envy). Furthermore, contextual facilitators (i.e., intergroup contact, shared group membership) and barriers (i.e., a bad reputation) of prosocial actions will be presented. Finally, we will discuss country-level differences in pro- and antisocial behaviors (i.e., social mindfulness and bribery behavior). Overall, the symposium offers an up-to-date summary of recent research on the composition of pro-social behavior and its determinants. Ultimately, it aims at encouraging the discussion about where the field stands and where it should head towards in the future.

From coordinating bodies to coordinating minds – decision making processes in joint action

Luke McEllin & Arianna Curioni
Central European University

From dancing tango to moving office furniture, many of our daily interactions involve joint actions whereby we coordinate our actions in space and time in order to achieve individual and shared goals. Whilst the sensorimotor processes that guide action coordination, such as motor planning, action prediction, and movement adaptation are well understood, the decision-making processes that support joint action have been relatively less investigated. This is surprising considering the multitude of decisions that we need to make in social settings, even before we start to coordinate with each other. Deciding who to interact with and who to avoid, judging the properties of objects in the environment in light of each other's perspectives, and figuring out how to distribute effort between actors, are crucial in ensuring the interaction runs smoothly. Sometimes we even need to consider whether or not it's worth carrying out a task jointly in the first place. This symposium aims to advance our understanding of the decision-making processes involved in joint action by presenting several empirical studies that explore how actors deal with the different decisions they are faced with, and how these decisions affect (and are affected by) the joint action. We will explore the mechanisms by which actors decide firstly whether or

not to engage in a coordinated interaction (Talk 1), secondly who to interact with (Talk 2). We will then talk about how individual actors use their partner's perspective to make more accurate judgements (Talk 3), and how individuals use their partner's effort level in order to decide themselves how much effort to invest into a task (Talk 4). The last two talks will explore how efficiency (Talk 5) and fairness (Talk 6) influence decisions on task distribution.

Fundamental processes and applied aspects of effort

David Framorando
University of Geneva

In recent decades, there has been a growing interest in studying the intensity dimension of motivation - effort - through physiological measurements. This research draws on motivational intensity theory (Brehm & Self, 1989), which identifies the conditions under which one should exert more or less effort. Wright (1996) linked Brehm's theory with Obrist's (1981) active coping approach and concluded that effort can be assessed by cardiovascular reactivity. On this basis, recent research in the field of motivational psychology has focused on identifying variables that might influence cardiovascular reactivity. This symposium will present exemplary recent work examining the role of implicit motives, lighting color temperature, objective ability, personal task choice, fatigue and self-control, and posture in the context of effort.

Indirect assessment of beliefs and attitudes: Conceptual elaboration and incremental validity of the propositional evaluation paradigm (PEP)

Maria Wirth & M. Clara P. de Paula Couto
Friedrich Schiller University Jena

The Propositional Evaluation Paradigm (PEP) has been recently introduced as an implicit measure to assess multiple propositional beliefs. First empirical evidence attests to the task's validity. In this symposium, we elaborate on procedural, conceptual, and practical aspects of the PEP. In the presentation by Cummins and colleagues, several research findings will be discussed that relate to the ability of the PEP to capture and reflect propositional beliefs. Best practices, advantages, and barriers of the task will be presented. Jusepeitis and colleagues present evidence for incremental validity of the PEP in predicting self-esteem correlates over and above established explicit self-esteem measures. Huang and colleagues present additional evidence for incremental validity of the PEP in the realm of implicit age stereotypes. Implicit endorsement predicted behavior even after controlling for endorsement of explicit age stereotypes. De Paula Couto and colleagues further investigate explicit and implicit endorsement of prescriptive age stereotypes and their age-specificity among young and older adults. PEP effects and explicitly endorsed stereotypes were found to be independent. Wirth and colleagues show that implicit endorsement of prescriptive age stereotypes measured by the PEP is sensitive to increased accessibility of these stereotypes. A matching effect between primed and

endorsed age norm was found.

Interaction with artificial intelligence – an interdisciplinary perspective

Nadia Said[1] & Andreea-Elena Potinteu[2]
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Artificial intelligence (AI) applications are increasingly used in everyday life. Whereas some of them are widely accepted (e.g., automatically compiled playlists), others are highly controversial (e.g., use of AI in the classroom). While on the one hand, the usage of autonomous cars could save about 50 million lives within the next 50 years this AI application is still viewed with skepticism. On the other hand, people already interact with AI daily online; often unaware of how this interaction might influence their beliefs and behaviors. This shows that the question about what kind of factors influence people's willingness to interact with AI is of utmost importance. Aim of this symposium is to present novel insights into human-AI interaction by bringing together research from cognitive psychology and philosophy to address two questions: (i) what factors are influencing our perceptions of and ultimately our interaction with AI and (ii) how does interacting with AI in turn influences us? To provide answers for those questions the first talk focuses on the role of AI risk-opportunity perceptions as well as AI knowledge in people's willingness to use AI-based applications in different fields. Going beyond abstract algorithms, the second talk then tackles the question under which conditions people are willing to help robots. The third talk focuses on the cognitive factors that are relevant for cooperation with AI. The fourth talk will then give an overview on how our interaction with AI in turn shapes and challenges people's perception of social interaction. In the final talk, the question how AI should be modeled as interaction partners is discussed. Jointly, these talks will give a broad overview on human-AI interaction by examining the topic from different perspectives.

Interplay between prior knowledge with new learning and memory

Iryna Schommartz & Yee Lee Shing
Goethe University Frankfurt

Prior knowledge provides mental schemas and frameworks that promote efficient incorporation of new information during learning and benefit subsequent memory. At the same time, when new information does not fit into pre-existing schemas, it has been shown to both hinder and benefit learning and memory. In this symposium with six talks, we provide empirical insights about the interplay between learning/memory and prior knowledge, using experimental paradigms, virtual reality, functional magnetic resonance imaging, eye tracking techniques, as well as neuro-pharmacological approach. We showed that (i) when remembering recent experiences, semantic substitution may lead to memory bias depending on the task-relevance; (ii) the (in)congruency effect differentially impacts memory accuracy and precision and follows different temporal dynamics

in the developing brain; (iii) prediction error as a result of mismatch between sensory evidence and prior knowledge may boost memory; (iv) schema-congruency determines the susceptibility of early memory formation and consolidation to the modulation by general anesthesia; (v) new schemas formed either through active agency or from an observer's perspective are associated with different neural correlates and memory malleability; (vi) pre-existing schemas of episodic information accumulation during active virtual navigation enhance long-delay memory consolidation and follow distinct developmental trajectories. Together, the presentations of this symposium provide empirical evidence that the effects of (in)congruency of new information on new learning and memory is complex and depends on several important modulating factors (i.e. developmental status, agency, schema strength, situation relevance, prediction error).

Mechanisms of learning and memory: Novel insights from EEG research

Siri-Maria Kamp
University of Trier

Mechanisms of learning and memory are difficult to study, in part because the different stages of memory processing cannot be easily separated based on behavioral outcomes alone, and because task or population characteristics limit the use of some behavioral analysis techniques. This symposium presents novel research capturing EEG activity during learning and memory tasks, including oscillatory activity and event-related potentials (ERPs), thus tracking neurocognitive activity in real-time and independently of behavior. The first talk reports that theta-oscillations recorded from intracranial EEG in the hippocampus occur during map-based spatial navigation in a spatial learning task. The second talk shows that theta-rhythms are already observed in early childhood and support the integration of newly learned category information into a semantic model of the world. The third talk examines the interleaving effect in inductive learning and shows that the effect is driven by a decrease in attentional processes during massing, reflected by alpha/beta-power during encoding. The fourth talk reports that fear and safety learning are tracked by the late positive potential and the P300 during learning and provides novel insights into this association. The fifth talk reports that familiarity, indexed by the early ERP old/new effect, contributes to associative memory retrieval when schema-supported associative processes are active during encoding. The last talk discusses the effect of stimulus properties on item retrieval mechanisms, indexed by ERPs during a recognition test, and on inter-item associative memory. Together, the results presented in this symposium open fruitful routes for future research promising novel insights into the mechanisms of learning and memory.

Metamemory

Beatrice G. Kuhlmann & Monika Undorf
University of Mannheim

Metamemory research focuses on people's knowledge about learning and memory and

on the assessment (monitoring) and regulation (control) of their ongoing learning and memory processes. This symposium presents current research on metamemory from labs in Poland, Portugal, Turkey, and Germany. The first two talks demonstrate the specific sensitivity of metamemory judgments in established memory paradigms. Using a misinformation paradigm, Yüksel and Besken show that degraded viewing conditions reduce both memory predictions and actual memory performance, but the integration of misinformation to retrieval remains unaffected. Hanczakowski et al. demonstrate that metamemory judgments disclose modulating effects of the number of context-to-item associations on context reinstatement even when the respective effects on recognition memory are inconclusive. The next two talks focus on the basis of people's predictions of their future memory performance (judgments of learning, JOLs). Mendes and Undorf present research indicating that JOLs rely on objective and subjective word frequency in multiple-cue situations. Undorf, Navarro-Báez, and Bröder present a novel methodological approach for uncovering hitherto elusive influences of idiosyncratic information on JOLs. The final two talks investigate the debiasing of metamemory illusions. Schaper et al. report evidence that alleviating the expectancy illusion improves the accuracy of metamemory monitoring and control but has little effect on actual memory performance. Zimdahl and Undorf report results showing that neither warnings nor incentives reduce the hindsight bias on JOLs. Together, the six talks of this symposium present new insights on metamemory monitoring and control.

Modelling cognition I: Model development, comparison, validation and application

Constantin G. Meyer-Grant & Anne Voormann
University of Freiburg

In recent years, formal models have become increasingly popular among researchers in cognitive psychology thanks to their many advantages over non-formal theories. Compared to the latter, mathematical and statistical models are easier to falsify, force theorists to be precise, allow the deduction of consequences following the model assumptions, make accurate predictions, and often have several practical applications (Bjork, 1973). Utilizing such models for psychological research usually involves several different steps: model development, model comparison, model validation, and model application. In the first part of this symposium, we highlight these different aspects of working with formal models across numerous fields within cognitive psychology. We will start by looking at an instance of model development – namely, a novel evidence accumulation based model for binary choice tasks. This is followed by a talk about model comparison introducing a deep-learning based method for comparing complex Bayesian hierarchical models. Furthermore, we will take a closer look at model validation regarding different recognition memory models of paired stimuli. We will then shift our focus more towards the application of mathematical and statistical models. Hence, we will conclude the first part of the symposium with talks on how to model advice taking in a multilevel framework and on what multinomial processing tree models can tell us about the effect of alcohol consumption on memory.

Modelling cognition II: Understanding memory via modelling

Anne Voormann & Constantin G. Meyer-Grant
University of Freiburg

This second part of the symposium addresses one specific area within cognition: Memory. Since long time, various types of mathematical and statistical models help us to grasp and better understand the different aspects of memory. Through their formalization of processes, models provide a deeper understanding about the actual processes involved in memory decisions beyond recognition and recall performance. Additionally, models can be used as a statistic tool to address and solve research questions hard to assess otherwise. Thus, within this symposium, we aim to shed light on different aspects of memory using statistical modelling. However, not the models will be in the focus of this symposium but the memory processes that models help us to understand. Thus, we will start with inspecting the role of semantic associations in working memory and how models can capture binding effects in episodic memory. Next, we will have a closer look to the connection between working memory and long-term memory. Regarding long-term memory, we will subsequently assess certain phenomena that appear within long-term memory and will hear about the processes that must be assumed in order to explain such phenomena. We will close the symposium with a talk about metamemory, the ability to use cues for predictions about the own memory ability.

More than "truth by repetition" – novel insights on the effects of repeating information

Felix Speckmann & Anne Irena Weitzel
University of Cologne

Judging a given statement as true or false is an important but non-trivial task that people perform every day. In times of fake news, conspiracy theories, alternative facts, and misinformation campaigns, it can be difficult to correctly judge the truthfulness of a statement. This judgment process is influenced by repetition: People are more likely to believe repeated information than novel information. This effect is called the "repetition-induced truth effect" or simply the "truth effect". Understanding the underpinnings of and the processes involved in the truth effect is highly relevant because it can lead to effective interventions targeted at reducing the credibility of false information. In this symposium, we present our work on various aspects of the truth effect while also going beyond mere truth judgments to include different effects of repetition. First, Teresa Garcia-Marques will present work on the attenuation of the truth effect when using emotional statements. Second, Christian Unkelbach will present research on the interplay of monetary incentives and advisors and how they influence truth judgments. Third, Anne Irena Weitzel talk about work on the evaluative consequences for advisors if their advice is incongruent with repetition. Fourth, Rita Silva will present research examining the influence of source trustworthiness on judgments of truth. Fifth, Felix Speckmann will present work on the effect of repetition on judgments of knowledge (i.e., "Did you know this before the experiment?"). Sixth, Jasmin Richter will show work examining the influence of repetition on perceived morality of statements.

Multimodal multitasking: The influence of modality compatibility in the context of task-switching and dual-tasking

Denise N. Stephan & Erik Friedgen
RWTH Aachen University

Talking on a cell-phone while driving – this classic multitasking example indicates that we are acting in a multimodal environment choosing from a vast variety of possible responses. While numerous studies demonstrated that multitasking is costly, these multitasking costs vary substantially depending on the specific modality mappings (i.e., compatibility) even if the degree of sensory and motor interference is equated across conditions. More specifically, performing multiple modality-compatible tasks either simultaneously (i.e., dual task) or in alternation (i.e., task switching) over a short time range leads to less performance costs than performing incompatible tasks. To explain this influence of modality compatibility the ideomotor idea is embraced, suggesting that actions are preceded by the anticipation of their sensory consequences. Accordingly, it is argued that stimuli matching the anticipated response consequences in terms of modality are modality-compatible (e.g., vocal responses generate auditory effects, i.e., auditory-vocal tasks are modality-compatible). This symposium provides an overview of the current state of the art followed by the new and diverse insights regarding modality compatibility, like the role of natural effects of the responses (i.e., sound of one's own speech) in contrast to inducing action effects experimentally, the effect of modality compatibility on voluntary task choices, the influence of fatigue on modality-compatibility effects, the impact of modality compatibility on between-task adjustments, as well as possible training effects. Against this background, different explanations for the cause of modality-compatibility effects – a monitoring bottleneck, shortened central stages, resource competition, or crosstalk – will be discussed.

Perception and action in sports

Iris Güldenpenning[1] & Andrea Polzien[2]
[1]*Paderborn University,* [2]*Osnabrück University*

Action planning in sports is based on the perception of mostly complex situations and the intention to achieve a certain goal. Therefore, the study of the interplay between perception and action is a central topic of sports psychology. A particularly relevant aspect of perception in sport is anticipation, that is, the prediction of perceived actions. To make the right decisions, athletes, but also referees, rely on different sensory modalities (e.g., visual, auditory, tactile) as well as contextual information. In the first presentation, Müller and colleagues speak about the use of auditory and contextual information for anticipating ball flight in tennis. Following this, Meyer and colleagues show that the anticipation of the direction of penalty kicks is facilitated when a weight is attached to the kicking leg of the shooters. Wühr and Memmert studied the offside decisions of referees and were able to show that a better contrast between the background (i.e., football turf) and the players (i.e., the jersey color) leads to more offside decisions. In basketball, timeouts are used to give tactical instructions to the players. The fourth

presentation by Krause and Weigelt focuses on how different rotation angles of visual tactic boards in basketball affect the information processing and execution performance of athletes and novices. Athletes not only use different sensory and contextual information to anticipate actions, but also use deceptive actions to hinder their opponents' anticipation performance. The question arises whether the execution of a deceptive action comes with a cost for the deceptive player. Böer and colleagues address this question in the fifth talk, which examines the cost of performing a head fake in basketball.

Perspectives on error processing and error awareness

Eva Niessen
University of Cologne

The symposium highlights recent neuroscientific advances in the field of error processing. Errors are useful sources for individual improvements, and processing errors is essential for action adaptation. The presenting authors investigate error processing with diverse and multi-methodological approaches (e.g., experimental manipulations complemented by innovative analysing techniques). Overall, the symposium conveys recent ideas about the neural mechanisms underlying error awareness and behavioural and neural consequences thereof. We will present different influential factors that induce changes in error detection (Niessen, Porth, Steinhauser). These manipulations will be extended by approaches that identify important sources for the formation of error awareness (Overhoff, Porth). The presented findings can be largely generalized, because the tested samples range from young, healthy participants (Mattes, Niessen, Porth, Steinhauser) over participants across the adult lifespan (Overhoff) to a clinical sample (Balzus). One study elucidates the influence of individual differences on neural mechanisms of error processing and behavioural adaptations by differentiating two dimensions of perfectionism (Mattes). Extreme and clinically relevant perfectionism can result in obsessive-compulsive disorder (OCD), which will be of interest in the clinical study (Balzus). Thus, the presentations nicely complement each other. Most talks include neuroscientific measures in terms of EEG (Balzus, Mattes, Porth, Steinhauser) and inform about the neural mechanisms underlying error processing. Finally, we introduce two experimental approaches as potential ways to assess error awareness with high ecological validity because they reflect error processing in everyday tasks (Niessen,Steinhauser).

Recent advances in binding and retrieval in action control I: Action plans, responses and outcomes

Malte Möller[1] & Mrudula Arunkumar[2]
[1]*University of Passau,* [2]*Friedrich Schiller University Jena*

Humans interact with their environment with remarkable ease. This is astonishing given that, in most situations, humans have the option to act in various ways, but must choose the appropriate actions to achieve a certain goal. Mechanisms underlying human action control have been traditionally studied in several research domains, focussing on different but related phenomena, theories, and experimental approaches. Recently, the Binding

and Retrieval in Action Control framework (BRAC, Frings et al. 2020) offered a unifying perspective on research on human action control by proposing stimulus binding and retrieval as two basic, functionally separable processes that can account for a broad range of related experimental phenomena across a variety of tasks. The first part of the symposium introduces the BRAC framework and its core mechanisms, followed by recent advances regarding the continuous measurement of the impact of S-R binding on performance, the formation of S-R episodes in action planning and after error commission as well as the binding between sequential responses. The last contribution of part I is concerned with the impact of affective consequences on binding and retrieval of S-R episodes. Together, the research presented in the symposium highlights the utility of the BRAC framework as a starting point to generate new insights into the mechanisms that guide controlled human behaviour.

Recent advances in binding and retrieval in action control II: Context, learning, and binding by observation

Andrea M. Philipp[1] & Juhi Parmar[2]
[1]*RWTH Aachen University,* [2]*Friedrich Schiller University Jena*

Humans interact with their environment with remarkable ease. This is astonishing given that, in most situations, humans have the option to act in various ways, but must choose the appropriate actions to achieve a certain goal. Mechanisms underlying human action control have been traditionally studied in several research domains, focussing on different but related phenomena, theories, and experimental approaches. Recently, the Binding and Retrieval in Action Control framework (BRAC, Frings et al. 2020) offered a unifying perspective on research on human action control by proposing stimulus binding and retrieval as two basic, functionally separable processes that can account for a broad range of related experimental phenomena across a variety of tasks. The second part of the symposium starts with a focus on the inclusion of task-irrelevant cue and context information in S-R bindings, the structure of S-R bindings involving context, as well as the relation between context binding and cognitive control. The subsequent talk connects the BRAC framework to contingency learning while the final contribution presents evidence that S-R bindings can be acquired by observation even in online settings beyond the laboratory. Together, the research presented in the symposium highlights the utility of the BRAC framework as a starting point to generate new insights into the mechanisms that guide controlled human behaviour.

Scalable interactions

Anke Huckauf[1], Marian Sauter[1], & Tobias Grundgeiger[2]
[1]*Ulm University,* [2]*Julius Maximilian University of Würzburg*

The global advancement of ubiquitous computing environments shapes our day-to-day interactions. Notebooks, smartphones, desktop computers, cars, intelligent lighting, or multi-room entertainment systems offer a plethora of interaction techniques using touch, voice, mouse, gestures, or gaze. The shift from interacting with dedicated “computers” to

interacting with distributed ensembles of computational devices (so-called pervasive computing environments) will fundamentally change our understanding of interacting with a "system". While the trend towards pervasive computing environments is already apparent, we have a scant understanding of how to scale interaction paradigms to assure for recognition and comparable functioning, when the number, diversity and complexity of devices increase. In the DFG priority program 2199 "Scalable Interaction Paradigms for Pervasive Computing Environments", an interdisciplinary consortium investigates scalable interaction paradigms. From a psychological perspective, relevant questions address design issues as well as effects of various ways of scaling interaction in pervasive environments. In this symposium, we present project-related research that is of special interest to experimental psychologists. In particular, we show how to investigate crowd attention in large online environments (Marian Sauter et al), how interactions with technology in safety-critical domains (i.e. anesthesiology) shape user experience (Anna Hohm et al), how drones can be used to facilitate interactions in virtual and mixed reality (Matthias Hoppe et al), how sensory illusions can be used to enrich haptic experiences (Marco Kurzweg et al) and finally, how we can further study technology interactions in large dynamic social contexts (Alarith Uhde et al).

Sichere und komfortable Interaktion von Verkehrsteilnehmenden mit hochautomatisierten Fahrzeugen im Straßenverkehr

Christine Sutter[1] & Michael Oehl[2]
[1]*German Police University,* [2]*German Aerospace Center*

Der Mischverkehr mit Fahrzeugen unterschiedlicher Automatisierungsgrade wird das Straßenverkehrsgeschehen der kommenden Jahre prägen. Eine wichtige Voraussetzung für die Verkehrssicherheit wird dabei die sichere, eindeutige und erwartungskonforme Interaktion der Verkehrsteilnehmenden mit hoch- und vollautomatisiert betriebenen Fahrzeugen sein – im Fahrzeuginneren mit den Nutzenden des Fahrzeugs sowie außerhalb des Fahrzeugs mit umgebenden Verkehrsteilnehmenden. Diese Interaktion kann beispielsweise nach außen über externale Mensch-Maschine-Schnittstellen erfolgen, deren Designs bislang in eher nur 1-zu-1-Szenarien untersucht wurden. Inzwischen müssen diese Mensch-Maschine-Interaktionen allerdings ökologisch valider bspw. für urbanen Mischverkehr in zunehmend komplexeren Verkehrsszenarien erforscht werden. In den sechs ausführlichen Vorträgen des Symposiums werden dazu empirische Befunde vorgestellt und jeweils kurz diskutiert. Der Fokus wird besonders auf den verkehrspsychologischen Determinanten einer sicheren und komfortablen Interaktion für die Verkehrsteilnehmenden mit Fahrzeugen im hoch- oder vollautomatisierten Betrieb liegen. In der abschließenden Gesamtdiskussion im Plenum werden die Grenzen der Mensch-Maschine-Schnittstellen in komplexeren Verkehrsszenarien ausgelotet sowie die Bandbreite der Gestaltungs- und Evaluierungsmöglichkeiten einer sicheren und komfortablen Verkehrsraumnutzung durch Fahrzeugautomatisierung auf Grundlage der neuen empirischen Befunde erörtert.

Source memory

Nikoletta Symeonidou & Hilal Tanyas
University of Mannheim

Source memory is a crucial cognitive function that enables us to remember episodic details of information. This symposium will bring together six researchers who will present recent evidence obtained from various substantive and methodological research questions about source memory. First, Tanyas et al. present an extension of the two-high-threshold multinomial processing tree model of source monitoring to response time data to measure the relative speeds of item and source memory in addition to item and source memory performance. Then, Kuhlmann et al. report recent results on the differences in patterns of item versus source forgetting, revealing that hippocampus-dependent source memory is more resilient to shorter-term interference-based forgetting but susceptible to longer-term decay-based forgetting (relative to item memory). Focusing on more applied source memory research, Kroneisen and Thielmann showed that especially people with low levels on the HEXACO personality factor "Agreeableness" had better source memory for cheaters. Following this, Symeonidou et al. present two studies investigating whether the age-related positivity bias found in item memory also shows in source memory for positive sources. Next, Schellhaas et al. query whether processing of faces in threatening contexts/sources can influence our automatic emotional reaction towards these faces in the absence of conscious recollection. Finally, Niedziałkowska et al. investigate memory processes that contribute to false recognition of distractors that share source features (e.g., category and color) with targets.

Test-potentiated learning: Recent research in the memory laboratory and applied educational settings

Bernhard Pastötter
University of Trier

Testing potentiates learning and long-term retention. For instance, a direct benefit of testing, referred to as the (backward) testing effect, is the finding that retrieval practice of previously studied information improves its long-term retention more than other forms of reprocessing the information do (e.g., restudy or concept mapping). In addition, there are indirect benefits of testing. For instance, testing potentiates relearning of the previously studied information (test-potentiated learning with feedback) and also enhances new learning of subsequently studied other information (forward testing effect). The speakers of this symposium present their recent research on the benefits of testing, both in the memory laboratory (Abel, Kliegl, Pastötter) and applied educational settings (Glaser, Kubik, Weissgerber), examining mediating and moderating factors and addressing both theoretical and practical aspects.

The active information sampler – information sampling approaches to judgement and decision making

Linda McCaughey
Heidelberg University

Cognitive-ecological approaches have emphasised the influence of the information sample on judgements and decisions. Yet, samples are often actively solicited, implying a causal path from the cognitive processing stage back to the sampling stage, adding rich endogenous sampling aspects to the framework. Niese will demonstrate how the sample available to the decision-maker can induce framing effects without assuming biased information processing. Prager will discuss how the evidence conveyed by a sample of character traits influences the decision to truncate an unfolding sample, resulting impression judgements, and perceived target homogeneity. Also concerned with sample truncation, McCaughey will present findings suggesting that the sampling process is influenced by cost considerations. And although decision makers are sensitive to changing information sampling costs, this sensitivity is limited. Alves will introduce a sampling principle according to which people often rely on samples of distinct and surprising information, among which negative information is overrepresented. A number of well-known evaluative biases can be explained by the priority of distinct information in the formation of attitudes. Biella will elaborate on how an individual's sampling goal influences the sources they select. In sampling social information, a hedonic sampling goal induces a stronger tendency to move on to the next source after negative information than an epistemic goal. Focussing on the interplay between information sampling and contingency inference, Bott will present evidence that despite premature exploitation, self-determined sampling can, under certain conditions, foster the proper use of the sampled information for contingency judgements.

The role of modal and amodal representations in cognitive functions

Karin Maria Bausenhart & Nicoletta Simi
University of Tübingen

Historically, it was often assumed that central cognitive functions, such as thinking, decision making, and speech comprehension, are based on abstract or symbolic cognitive representations. Such representations would not directly preserve the structural properties of their physical referents, but encode them in an amodal fashion, for example, in the form of propositional or schematic representations. Therefore, sensory-motor experience based on specific modal properties of the referents should have little impact on central processing. In contrast, alternative theoretical approaches proceed from a more embodied perspective. Such accounts suppose that cognitive processes operate on rather concrete and experiential representations. Accordingly, such representations would still preserve the modal properties of their referents, and these modal properties may in turn impact on the results of cognitive operations. There is increasing evidence that such modal representations based on sensory-motor experience not only emerge in perceptual and motor stages of processing, but also play an important role in more central cognitive

processes. To reconcile these originally opposing views, it seems promising to assume that cognitive representations at all processing stages may range on a continuum from modal to amodal, where different representational formats may inform various cognitive operations and serve different goals. In this symposium, we will explore the role of modality, embodied experience, and abstraction in various aspects of cognitive processing, such as language production (Abdel Rahman & Vogt), cognitive control (Simi et al.), multitasking performance (Koch & Stephan), orientation behavior (LeVinh et al.), and motor planning (Bhatia et al.).

Virtualizing sensory-motor interactions in normal and clinical settings

Guido Hesselmann[1] & Eckart Zimmermann[2]
[1]*Berlin Psychological University,* [2]*Heinrich Heine University Düsseldorf*

Advances in technology often allow for new approaches in their respective field. Due to continuous improvements and increasing affordability, the integration of virtual reality (VR) has established itself as a useful tool in the study of human cognition in the laboratory. VR devices release the visual system from stimuli off the real world and compute a new environment, which the participant is immersed into by creating a sensation of presence in this virtual world. As virtual environments are fully controllable, VR devices allow for innovative manipulations of the sensory input. This symposium provides an overview of state-of-the-art approaches integrating VR into normal and clinical settings, and aims to highlight the scope and limits of virtualizing sensory-motor interactions. First, Lengenhager will present research examining the adaptiveness of the bodily self through VR immersion and synchronous multisensory stimulation. Next, Belger, Wagner, Gaebler and Thöne-Otto will present a new tool for the assessment of visuo-spatial neglect in individuals after stroke via a novel VR street crossing task. Then, Graman will provide an overview of experimental approaches used in the Berlin Mobile Brain/Body Imaging Labs, and discuss the advantages and limits of combining VR with EEG and motion capture. Wiesing and Zimmermann, as well as Kiepe and Hesselmann, will demonstrate innovative approaches to investigate sensory-motor interactions in VR. Last, Keshava, Gottschewsky, Balle, Nezami, Schüler and König will present their research investigating differences in visual attention orienting between low realism- versus high realism virtual environments.

Talks

A comparison of objective and subjective locus of attention as a window into gist generation

Ines Marberg, Danny Dirker, & Johannes Gerwien
Heidelberg University

In a single glance, the so-called apprehension phase, people can extract the gist of a visually presented scene and decide where to send the eyes (in what order) to extract more detailed information (Oliva, 2005). The gist is sometimes also equated with a coarse plan of what people will say about a scene if their task is to describe it (Bock et al. 2003). However, it is still an open question to what extent and how patterns of covert attention allocation emerge during the apprehension phase and how top-down (e.g., task) or bottom-up (properties of the stimulus) factors modulate covert attention allocation. In this exploratory study, we compare first saccade landing sites as a measure of the objective location of attention allocation with mouse click locations on a blank screen as a measure of the subjective location of attention allocation after a brief stimulus presentation (250ms, photographs of natural scenes). We compare both measures under two different tasks: inspection vs. description. In addition, we manipulated stimulus complexity. Results show that mouse clicks lead to a more dispersed distribution than first saccade landing sites. We interpret both measures to reflect different stages (points in time) during gist generation. Furthermore, our results suggest that both measures are highly influenced by top-down processing from early on, whereas bottom-up effects show only a small effect.

A computational model predicts individual aesthetic judgments

Aenne A. Brielmann, Max Berentelg, & Peter Dayan
Max Planck Institute for Biological Cybernetics

Where do you want to live? With whom? Do you like that image or swipe it away? Numerous decisions, big and small, partly depend on options' sensory appeal. Yet, we have a poor understanding of how sensory experiences gain value and how these values influence our decisions. We propose the theory that observers maintain and adapt the states of their cognitive-sensory system in order to process stimuli effectively now and in the future. Two interlinked components generate an object's sensory value: 1) processing fluency – the likelihood of a stimulus given an observer's state; 2) the change in fluency with which likely future stimuli will be processed – the change in the average likelihood of expected future stimuli. We test a simple realization of this theory that represents current and expected stimulus likelihoods as n-dimensional Gaussians. To control the position of naturalistic stimuli in this n-dimensional space, we created 55 morphed images from seven original pictures. Our participants ($N = 59$) first rated how much they liked each image. Then, they spent 15 minutes viewing the images, one at a time in random order, repeating after all 55 had been shown, while being given the option to move on to the next image whenever they wanted to. Finally, they rated all images again. We fit our model and alternative models to the first ratings. We then predicted the second ratings based on model fits and viewing times from the free-viewing part of the experiment. Our model explains, on average, 50% of the variance in the second ratings, and it outperforms

regression models with equivalent predictor variables in most cases (40/59 participants). In brief, we show that our computational model of sensory value can predict individual aesthetic judgments and their change over time.

A field study on take-overs during highly-dynamic lane changes in automated driving

Stefan Brandenburg, Sandra Epple, Anna Trukenbrod, & Manfred Thüring
Technical University of Berlin

In the past, driver interactions with automated vehicles in critical driving maneuvers have mainly been studied using driving simulators. The present field study evaluates the driver's subjective experiences, behavior, and performance after resuming vehicle control in highly dynamic lane-change maneuvers. Therefore, we manipulated time headway (THW) and traction usage (TU) to vary the objective criticality of take-over situations. We assessed the take-over behavior and performance of 25 drivers and their ratings of subjective criticality, perceived effort, and perceived performance. In contrast to previous simulator studies, driver ratings of the take-over situation and driver behavior were affected by variations in TU or TU and THW but not for changes in THW only. Also, drivers braked and steered more extreme when taking over before the first lane change in a double lane change maneuver. We conclude that the results of driving simulator studies that examine highly dynamic lane change maneuvers may not be transferred directly to the field. Here, driver behavior seems more influenced by the forces that drivers (expect to) feel than visual information like in the driving simulator. The study's results undermine the need for field tests when examining driver interactions with automation in highly dynamic driving maneuvers. These field tests may reveal indicators of driver behavior, helping to design take-over assistance systems for automated vehicles.

A Lévy-flight model of decision making

Andreas Voss & Marie Wieschen
Heidelberg University

Most cognitive models of decision making assume a continuous process of evidence accumulation. Usually, evidence accumulation is considered to be noisy, that is, it is determined by a combination stimulus information and random noise. The combination of a constant systematic speed of information acquisition and Gaussian noise is described mathematically by a diffusion process, which gives the name to the most influential model in this class, the diffusion model. One problem with the standard diffusion model is that additional processes must be included to explain fast errors, which are typically observed in fast perceptual decisions. For the diffusion model, for example, we must introduce the assumption of trial-to-trial variations in the starting point position to account for fast errors. In contrast, we hypothesize that the process of evidence accumulation itself causes fast errors (e.g., fast guessing). In our model, guessing-like processes in evidence accumulation are reflected by large sudden changes ("jumps") in evidence accumulation. This can be accounted for mathematically by replacing the Gaussian noise with a heavy

tailed noise distribution (e.g., the Cauchy distribution), thereby replacing the diffusion process with a Lévy flight. In a series of experiments, we demonstrate the power of the Levy-Flight model to explain behavioral data from different experimental paradigms.

A new approach to measuring dishonesty in online studies

Jonas Ludwig
Julius Maximilian University of Würzburg

Based on a behavioral measure of cheating, I present a new procedure to investigate unsolicited dishonest acts in online environments. In a series of studies, participants worked on an incentivized trivia quiz-type general knowledge test, meanwhile the number of clicks to external browser tabs was recorded. Participants were categorized as potential cheaters if they clicked outside the browser tab running the web study at least once during the quiz. A first experiment ($N = 299$) manipulated the ease of retrieving correct answers by a simple online search. The click count predicted performance in the quiz, but only if correct answers were easily found online. This supported the assumption that participants clicked to other browser tabs mainly to search for the correct solutions. Expanding on these results, I report on the further development and validation of this new approach to measuring dishonest behavior. Across three independent samples (combined $N = 979$), more than one quarter of participants took the opportunity to cheat despite the explicit instruction not to do so, thereby substantially improving their performance and individual earnings. One additional click to another browser tab increased the odds of scoring higher on the quiz by up to 19%, confirming a robust link between the number of clicks and test performance. In addition, using the click count as an indicator for cheating behavior replicated known phenomena in dishonesty research, for instance that males were more likely to cheat than females. These results supported the validity of the operationalization. Dishonesty may thus be quantified by counting the number of clicks to second browser tabs, offering an inconspicuous and ecologically valid way of measuring dishonest behavior in online experiments.

A playlist from the past: Musical associations and nostalgic feelings

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Music is able to elicit strong emotions and can be used to induce feelings of nostalgia, and to prime biographic memories that are formative for one's self concept. This might have beneficial effects for finding and pursuing long-term goals in life (Sedikides et al., 2018). In two separate studies, we examined musical phenomena from popular culture in relation to nostalgic feelings. Study 1 ($n = 40$) used the title songs from five very popular children's TV series from the 90s. People between 19 and 67 years listened to the songs and were, after each song, asked for ratings, verbal assessments and associations related to those songs. In Study 2, 46 people who were deliberately drawn from a narrow age range

(23 to 27 years) were asked to compile their own playlist – the contemporary equivalent of a mixtape – of five songs that "remind you of your own youth". They answered ratings and open questions regarding their associations after listening to each song. Also, their facial expressions were recorded on video and assessed with the FaceReader software. We demonstrated in both studies that biography-related music has a potential for evoking strong and positive emotions. Both studies also showed that, depending on person and context, mixed and "bittersweet" emotions are integral part of the experience. By associating past emotions and experiences with distinct tunes, they get accessible for a present context—in the words of Gustav Theodor Fechner, amalgamating with the "sensual impression, thus enriching it, illustrating it". We also found that a multi-methodological approach of quantitative and qualitative assessments, supported by an automated evaluation of facial expressions, is expedient to grasp the manifold experience of connecting to one's earlier self via music.

A psychophysiological investigation of mourning

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Mourning constitutes an important human emotion, which might cause – among other things – major depressive symptoms when lasting for too long. To date, no study investigated whether mourning is related to specific psychophysiological activation patterns. Therefore, we examined physiological reactions induced by iconographic mourning-related stimuli in comparison to neutral and attachment stimuli in healthy adults ($N = 77$, $M_{\text{age}} = 21.9$). We evaluated pupillometric and eye-tracking parameters as well as heart rate variability (HRV) and skin conductance (EDA). Eye-tracking revealed a stronger dilated pupil during mourning in comparison to the neutral, but not to the attachment condition; furthermore, fixation patterns revealed less fixations on mourning stimuli. While HF HRV was reduced during mourning and attachment, we found no differences concerning LF HRV and EDA parameters between conditions. Results suggest specific eye-movement and pupil adaptations during representations of mourning, which might point toward inward cognition or avoidance, but no specific physiological pattern concerning HRV and EDA.

A TVA-based account of response times: Current developments and future directions

Steven Blurton, Søren Kyllingsbæk, Anders Petersen, Claus Bundesen, & Signe Allerup Vangkilde
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In this talk, we present recent theoretical advancements in TVA that include a TVA-based account for response time (RT) distributions and outline future directions that are based on these advancements. Although the scope of TVA is more general, TVA-based research so far has focused on accuracy-based tasks using highly discriminable stimuli to investigate mechanisms of attention on selection of categories (pigeonholing) and selection

of elements (filtering). We have recently extended this framework to describe perceptual categorisation in mutually confusable stimuli. The account is compatible with many other theories, serving as a back-end to explain perceptual decisions depending on exponential processing rates. Using TVA as a front-end, we have tested the new model with data from single stimulus recognition tasks with two or more perceptual categories. We present new applications to speeded responses to targets presented among distractors. The new model can account well for feature search distributions just by incorporating the filtering mechanism of TVA. The model is also applicable to conjunction search, but this required introducing of a novel set of weights that describe possible serial processing, effectively combining TVA with Guided Search. Newer directions include applications of the model in tasks that involve cognitive control, such as the Simon task. For this, we added a TVA-like response selection stage to the model and use the theory of Executive Control of TVA (Logan & Gordon, 2001, *Psychological Review*) to make the model appliable to data obtained in experiments that include response conflicts.

Across task adaptation between cognitive and emotional conflict

Elisa Ruth Straub[1], Moritz Schiltenwolf[2], Andrea Kiesel[1], & David Dignath[2]
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The cognitive processing of task-irrelevant distractors has potential to interfere with task performance. Our cognitive system has evolved dedicated control mechanisms that suppress interference from task-irrelevant distraction and lead to control-related adjustments in cognitive tasks. However, in real-world situations, we constantly react in the presence of affective stimuli and emotional conflict (such as irony, where emotion portrayed by the face and the voice do not coincide) is an inherent part of human social interactions. But is control confined to ´cognitive´ disturbances or also able to transfer across tasks that induce emotional conflict? We investigate how cognitive and emotional processing interact in Gender Face Stroop Tasks that induce cognitive conflict and Emotional Face Stroop Tasks that were used to study implicit emotion regulation. We hypothesize that conflict-triggered control transfers across the two tasks that comprise the same relevant dimension (i.e., picture of a face) and the same irrelevant dimension (i.e., distractor word). We further asked, how predictability of task-type influences conflict adaptation effects by manipulating the order of tasks in an alternating-two-runs design (Experiment 1, $n = 89$) and a quasi-randomized design (Experiment 2, $n = 88$). We found reliable across-task adaptation effects from Gender to Emotional Stroop Tasks and vice versa in both Experiments. Our results contribute to observations from neuroimaging studies that demonstrate a common conflict-detection mechanism in Emotional and Gender Stroop Tasks. We propose a domain-general control mechanism involved in monitoring and resolution of conflicts across the cognitive and affective domains.

Action affordance affects proximal and distal goal-oriented planning

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Osnabrück University

Visual attention is mainly goal-directed and allocated based on the action performed. However, it is unclear how far these results generalize to cognition in more naturalistic settings. The present study investigates active inference processes revealed by eye movements during interaction with familiar and novel tools with two levels of realism of the action affordance. In the first experiment, participants interacted with a VR controller in a low realism environment; in the second, they performed the task with an interaction setup that allowed differentiated hand and finger movements in a high realism environment. We investigated the differences in odds of fixations and their eccentricity towards the tool parts before action initiation. The results show that participants fixate more on the tool's effector part before action initiation for the use task for unfamiliar tools. The spatial viewing bias on the tool reveals early fixations are influenced by the task and the familiarity of the tools. Later fixations are associated with the manual planning of the interaction. Our findings show that fixations are made in a task-oriented way to plan the intended action well before action initiation. With more realistic action affordances, fixations are made towards the proximal goal of optimally planning the grasp even though the perceived action on the tools is identical for both experimental setups. Taken together, proximal and distal goal-oriented planning is contextualized to the realism of action/interaction afforded by an environment.

Adaptively trading off benefits and costs of information in sample-based decisions

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Searching for information prior to a decision is one of the most common decision-related activities. After all, more information almost always leads to better decisions. However, it also comes at a cost, financial or otherwise. To examine how well people can trade off those costs and benefits, we conducted two experiments, in which a total of 158 participants made sample-based decisions involving costly sampling and reward and punishment for correct and incorrect decisions, respectively. Across four blocks, the ratio of information cost and payoff changed, either due to a change in only one of the constituting parameters for better relative comparability (Exp. 1), or due to changes in both parameters (Exp. 2). Overall, participants were sensitive to the cost ratio changes, meaning that they adapted their search behaviour to the changes, with regressions of sample size on cost ratio resulting in a mean coefficient of $M_r = -.24$, $t(72) = -10.08$, $p < .001$, for Experiment 1, and, $M_r = -.17$, $t(83) = -7.03$, $p < .001$, for Experiment 2, potentially reflecting the lower comparability between cost ratios in Experiment 2. This indicates a non-negligible but small degree of adaptivity. Interestingly, participants sampled both too much and too little information, depending on the specific cost ratio. This shows how important it is to include more than one set of task parameters when investigating information search in decision making. On the one hand, this allows for the examination of adaptation to change, an important aspect of the real world. On the other hand, it safeguards against premature and overly general conclusions.

Aesthetic judgement as modulated by circadian rhythms

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The present study aimed to examine whether the circadian rhythm modulates our aesthetic judgement and explore the potential factors involved in such judgments. Eighteen participants were asked to rate the relative aesthetic values of a pair of paintings, artworks from a famous Chinese painter, once every two hours from 8:00 am to 10:00 pm. The results showed that time of day has a tendency to modulate the aesthetic judgement, however with inter-individual differences. The relative aesthetic judgements decreased significantly in the afternoon compared to morning hours and rebounded in the evening, with the second relative judgement compared to the first of the pair pictures being judged most "beautiful" at 2:00pm but "least beautiful" at 6:00pm. Among the examined factors, color and shape played most important roles in aesthetic judgement. Our results indicate that the circadian rhythm modulates our aesthetic experience, and further highlights the necessity to consider the time of day when investigating perceptual and cognitive functions.

Affective and semantic incongruency of occupational labels have disparate effects both in supra- and subthreshold face recognition tasks

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Recognition accuracy of faces can be enhanced by stimulating a specific part of the face-space. This can happen with labels suggesting social status, occupation, or typical behavior. The effect might be ascribed either to semantic information playing a role in recollection of memories, affective information evoked by the labels, or both. We designed two studies in which participants learned associations between faces and occupational labels. In Study 1, subjects were exposed to faces, preceded by labels for 500ms. In Study 2, they were primed with labels for 33ms. Faces appeared after either the learned labels, or after incorrectly paired labels, intertwined with unfamiliar faces. In the incongruent conditions the semantic and affective distances between the presented and the correct labels varied. The task was to respond to those faces they have encountered in the learning phase. Subjects responded slower to incongruent stimuli in both studies. This confirms the assumption that false labels activate a specific region of the face-space, which puts a cognitive load on recognition. In Study 1, the joint difference of semantic and affective contents had the largest effect. In Study 2, in contrast, reaction time was mostly influenced by the affective distance, semantic difference did not have significant effect on face recognition speed. To conclude, semantic information has a strong effect when it is consciously evaluated because it is mapped onto a smaller region of face-space and provides more accurate information. However, the processing of emotions evoked by a label might be quicker and precede conscious responses.

Age modulates the effects of response dynamics on the computation of confidence

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A central goal in metacognition research is to identify factors that drive the computation of confidence. In contrast to classical theories postulating confidence to be based on the same stimulus-related evidence that informs the decision, recent findings suggest that the motor output of a response might provide additional, post-decisional information to the monitoring system. To test the latter hypothesis, we measured response time and peak force in a four-choice flanker task with subsequent confidence judgement on a scale from 'surely wrong' to 'surely correct'. In 65 healthy adults with a wide age range, we revealed a double dissociation of effects of the response parameters and accuracy on confidence estimates. Replicating previous findings, we found that fast responses were associated with high confidence in correct, but not incorrect decisions. Notably, this association was more pronounced in older participants. On the contrary, peak force was unrelated to confidence in correct trials, but predicted confidence in incorrect decisions. However, this relationship was age-dependent: while the degree of peak force might serve as a cue for confidence in error trials for younger adults, older adults seemed not to be able to draw on this information. Our results add to the notion that the motor output and thus the entire decision process contribute to the computation of confidence. The differential use of distinct motor aspects in older age might result from different patterns of errors and might constitute either a compensatory or a detrimental mechanisms in the interpretation of interoceptive feedback, resulting in less accurate metacognitive judgements.

Aha-experiences in childhood

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From which age do children have Aha-experiences? This is an important question because solving a problem with an Aha-experience leads to a memory advantage and motivates the problem solver. As it is virtually impossible to ask young children about their inner experiences, difficult to observe Aha-experiences in situ, and unknown how to induce Aha-experiences in children, we asked parents about their children's Aha-experiences. In two studies, we asked parents about Aha-moments experienced by their children and content analyzed the reports in both studies ($N = 264$ in Study 1, Norway; $N = 256$ in Study 2, Prolific). In both studies, parents reported their children to have Aha-experiences even in their first year. With age, the relative proportion of Aha-experiences regarding motor actions (e.g., finding out how to cycle; finding the orientation of a puzzle piece) significantly decreased whereas the proportion of Aha-experiences regarding cognitive learning (insight related to arithmetic or reading) increased with age. We discuss methodological challenges of both parent surveys and the recognition of Aha-experiences from facial expression and behavior. In view of these challenges, we cautiously conclude that Aha-

experiences might already occur in infancy, which is much earlier than previously assumed, and that Aha-experiences related to motor actions decrease and Aha-experiences related to cognitive learning increase with age.

AI for science communication: How authorship and information presentation affect the acceptance of science journalism

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Research suggests that automatically produced and human-written content could be perceived as equivalent by readers regarding simple text types. But research on the AI authorship of longer texts with higher complexity and human-specific characteristics is scarce. Therefore, this presentation aims to extend the existing literature on automated journalism to the field of science communication by investigating the influence of AI authorship (vs. human authorship) and evaluative information presentation (vs. neutral information presentation) on the perceived credibility and trustworthiness of a science journalism article. The results of three experimental studies ($N_{\text{total}} = 715$) revealed no differences between human and AI-written texts concerning perceived credibility and trustworthiness. However, presenting information in an evaluative way decreased credibility and trustworthiness perceptions across all studies regardless of the declared author. Additionally, despite a lack of differences in credibility and trustworthiness perceptions, the AI was constantly perceived as less anthropomorphic than the human author. Finally, the belief in the machine heuristic was stronger for an AI than for a human author, particularly when participants had actually read an article allegedly written by an AI. Even though participants perceived the AI as less anthropomorphic and more machine-like, this did not seem to be reflected in the evaluation of the articles. This finding suggests a high level of acceptance of AI as an author of scientific texts. The results are discussed against the background of established communication theories and insights from previous research.

"Alexa, can I believe you?": How specific characteristics of voice assistants can affect message credibility perceptions during information search

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Voice assistants on smart speakers are becoming increasingly popular all over the world and offer a voice-based alternative to conventional text-based web search. With a two-study approach we explored how different search modalities can affect credibility perceptions and what role sponsor credibility and message accuracy play in this. Based on the MAIN Model by Sundar (2007) we assumed that modality, i.e., whether information is given via text or auditive can affect credibility assessments. To investigate this, a 2 (modality: smart speaker/search engine) × 2 (message accuracy: high/low) × 3 (sponsor credibility: high/low/none) mixed factorial experimental design was employed online

($N = 399$) and findings were tested again in a second experiment for replication purposes ($N = 398$). Main findings from both experiments revealed that information presented by smart speakers was generally perceived as more credible. Results further showed that no source attribution and low message accuracy affected message credibility perceptions less when a smart speaker was used instead of a classic search engine; especially for participants with lower topic involvement. With this, we gained valuable insights about the role of smart speakers for information search and potential downsides of this usage.

An enactive approach to augmenting situation awareness

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Safe mobility in traffic environments heavily rely on an individual's ability to perceive, comprehend, and anticipate relevant information for collision avoidance. Collectively termed "situation awareness", the lack thereof continues to be a major contribution to accidents attributed to human errors. How can we design technology to mitigate this? This presentation begins by addressing the critical factors for awareness formation, particularly in terms of those that can benefit from machine assistance. We argue in favor of a class of human-machine interaction that is best labelled 'augmentation', so termed as it requires active user engagement, preserved awareness, and minimal interaction complexity. This implicitly places authority (and liability) on the human and not the machine. A basis for this is established by fundamental theories and established findings on human sensorimotor processes. Finally, we demonstrate how this approach can lead to prototypes for augmenting situation awareness in driving, with results from user studies.

An interactive online study to investigate the causes of robot bullying

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When service robots enter public spaces the so-called 'robot bullying' can occur: the robot is impeded in its task execution or gets damaged. To prevent robot bullying, human motives for these disruptive actions need to be understood. In the interactive online study, the 41 subjects were told that they would meet a cleaning robot in the hallway and had the choice of interacting with the robot or walking by. If they chose to interact, they could choose one of three categories (friendly, mild bullying or severe bullying) and then a specific behaviour (e.g. touching) for which they saw the consequence afterwards (e.g. robot is damaged). This was repeated until the participant decided to pass the robot finally. The bullying categories were based on a pilot study with 19 subjects who rated the videos regarding the bullying severity. The majority (82%) chose not to interact with the robot. Those who interacted did so in a friendly manner. Only mild abuse and no severe bullying was selected. When asked about the reasons for their behaviour, 27% said they did not want to disturb the working robot, and 20% said they were not interested in the

robot. Lack of trust in the robot predicted disinterest. The results might indicate a more benevolent behaviour towards robots in public than expected, given that in an online study, one could have anonymously mistreated the robot. This online study contributes to the understanding of robot bullying and provides a methodological contribution to investigate robot bullying interactively online.

An occupied articulatory buffer does not interfere with conceptual preparation for verbal encoding

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Research on effects of the language one speaks on other, non-verbal aspects of cognition ("Whorfian effects") makes use of non-verbal tasks such as semantic categorization. Previous studies have faced the objection that participants may use language covertly in such tasks, thereby making it impossible to test for potential long lasting language effects. To avoid this, verbal interference paradigms were introduced. The logic is that by having participants repeat nonsense syllables while being involved in non-verbal tasks, their articulatory buffer were occupied, and so, internal language use were blocked, while non-verbal aspects of cognition were left intact. However, so far, no positive evidence is available that shows that verbal interference paradigms can indeed achieve this. Since covert and overt language is generated by the same cognitive sub-system we used an overt language production task to test whether an occupied articulatory buffer (induced by internal syllable rehearsal during a recall task) interfered with conceptualization/lexical selection. Based on the language production literature, we expected no interference effect. Findings from two experiments with German native speakers who produced verbal responses to visual stimuli of varying complexity under verbal interference and under control conditions suggest that an occupied articulatory buffer does not significantly interfere with the conceptual planning stages during verbalization. Our findings are, however, compatible with the view that working memory load leads to abnormal behavior under verbal interference/articulatory suppression.

Anchor objects guide attention and locomotion during natural behaviour in 3D environments

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Successful adaptive behaviour requires efficient attentional and locomotive systems. It has been thoroughly investigated how we achieve this efficiency during natural behaviour by exploiting prior knowledge related to the targets of our actions (e.g., attending to metallic targets when looking for a pot) and related to the environmental context (e.g., looking for the pot in a kitchen cabinet). Much less is known about if and how individual components of the environment which are not the target of our actions support efficient attentional allocation and goal-directed locomotion during natural behaviour. In our immersive virtual reality task, twenty-four participants searched for objects in naturalistic indoor

scenes that were manipulated regarding the presence and structural arrangement of large, static objects that "anchor" spatial predictions about targets (e.g., the sink provides a prediction for the location of the soap). Our results show that eye movements and body locomotion in this naturalistic setting are strongly guided by these anchor objects, i.e. both were less efficient in the absence of anchor objects. These findings demonstrate that objects auxiliary to the target can be incorporated into the representations guiding attention and locomotion. Our approach provides a critical step forward in understanding efficient adaptive behaviour in ecologically valid settings.

Animacy improves recognition by enhancing recollection: Convergent evidence from two experimental procedures

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Animacy has been established as an important determinant of memory during the last decade. Considering its postulated evolutionary-adaptive significance, the memory advantage of words for animate entities over words for inanimate entities (henceforth animacy effect) should not only affect the quantity but also the quality of remembering. We tested this assumption by examining animacy effects both on subjectively experienced retrieval states using the remember-know-guess paradigm (Experiment 1) and on objective performance-based measures of the quality of recognition using the process-dissociation procedure (Experiment 2). Proximate accounts of the animacy effect that focus on elaborative encoding and attention allow predicting animacy to selectively enhance detailed recollection but not the acontextual feeling of familiarity. We adopted a multinomial modeling approach to disentangle recollection, familiarity, and different types of guessing processes. Results obtained from the two experimental procedures convergently show that animacy selectively enhances recollection but affects neither familiarity nor guessing. The recognition advantage of words for animate entities over words for inanimate entities is thus primarily driven by enhanced recollection. The results support the richness-of-encoding account and the attentional account of the animacy effect on memory.

Appropriate training can enhance bottleneck coordination in dual-task situations

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In general, human performance is impaired in situations in which two different tasks are performed simultaneously. Presuming a stage model for dual-tasks (DT) with two choice reaction time tasks, this impairment is assumed to be caused by a central bottleneck occurring at the response selection (RS) stage, which are processed serially. The access to this bottleneck stage is regulated by two different mechanisms: (1) the passive "first-come-first-served" principle and additionally, (2) an active task-order coordination (TOC) mechanism. The current online study investigated whether this active TOC mechanism can be improved by training. This should lead to reduced TOC costs, which reflect the

extra demand that emerges when selecting and instantiating the appropriate task-order. For this purpose, $n = 46$ participants trained the same two visual-manual component tasks for 3 days in 3 different groups. One group practiced the tasks only in single-task (ST) blocks, another in DT blocks with fixed order of the component tasks, and the third group practiced DT blocks with random order of the tasks. In pre- and post-training sessions participants of all training groups completed ST, fixed DT, random DT trials in order to test for training-related improvements. This design allowed us to determine the TOC costs by calculating DT performance in random minus fixed DT trials for each group in pre- vs. post-training sessions and to compare the potential TOC improvement due to training. The results showed that exclusively participants who practiced to flexibly change the processing order (random order group) improved task-order coordination, which was reflected by training-related reduction of TOC costs only for that group.

Are you hurt yet? An interactive approach to reactive aggression

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Consequences of enacting revenge range from the often-devastating escalation of violence to experiencing a calm sense of forgiveness. Research on revenge often treats vengeful acts as singular experiences, an approach which fails to account for the role of outcome satisfaction in the regulation of reactive aggression. In a series of studies, we showcase the potential of integrating target reactions into dynamic revenge sequences to investigate the paradoxical consequences of revenge. In treating the provoked avenger as seeking a desired state within their interaction partner (such as defeat, pain, compliance), we discuss the complex affective evaluations of revenge outcomes, shedding light on mixed findings concerning the presence of negative and positive affect following revenge punishments. In Studies 1–2, we investigated affective responses towards negative target reactions and the regulation of aggression based on the evaluation of distinct harm indicators. In Study 3, we observed the significant escalation potential of opponent states incongruent with the desired opponent state, as it is the case when being confronted with Schadenfreude. In an additional series of studies, we observed changes in memory of opponent faces following vengeful encounters. Based on target state indicators (pain, anger), face memory was distorted, resulting in less negative representations of opponents that expressed pain. We argue that integrating dynamic interaction aspects, such as facial expressions as indicators of the target state, aids the process of identifying aggression trajectories and furthers our understanding of the goals and motives present during the escalation or de-escalation of vengeful acts.

Art forms in nature: Perceptual and aesthetic properties of Ernst Haeckel's drawings of new species

Johan Wagemans, Ines De Vlieghe, Christophe Bossens, Derya Soydaner, Claudia Damiano, & Eline Van Geert

KU Leuven

Most research in empirical aesthetics belongs to one of two camps: (1) focus on the relation between beauty and simple quantitative properties in well-controlled stimuli, (2) including a broader range of stimulus and aesthetic variables using more ecological stimuli such as natural images and art works. Ernst Haeckel's drawings of "Kunstformen der Natur" (1899–1904) are ideally suited as a bridge between these two traditions: They are plates consisting of a variable number of separately drawn art forms (e.g., plants, shells, animals), with different grey levels and colors for figures and backgrounds, with a good level of order (e.g., symmetry) and complexity (e.g., dense etchings) – all beautifully rendered and composed. In a large online study, we presented high-resolution scans of the 100 prints and two sets of 100 isolated art forms extracted from 16 prints to different groups of participants (total $N = 203$), which they had to rate on 7-point Likert scales for beauty, pleasure, interest, order, and complexity. In addition to basic demographics, all participants indicated their familiarity with biology and Haeckel, interest in art, connectedness with nature, and inclination to "otherworldliness". Beauty, pleasure and interest were strongly positively inter-correlated, while order and complexity were correlated negatively. Of the three aesthetic scales, interest was most strongly influenced by order and complexity. Average aesthetic ratings were higher for the whole plates than for the separate items ("parts"), across all stimuli as well as for specific wholes and parts from the same plates. Additional analyses will investigate relations with objective measures of order and complexity, as well as possible group differences as a function of some individual characteristics.

Assessing age specificity in implicit endorsement of prescriptive age stereotypes with the propositional evaluation paradigm (PEP)

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In this study, we investigated implicit and explicit endorsement of prescriptive age stereotypes and whether such endorsement is age-specific in that certain prescriptions target specific age groups. To achieve that, we captured endorsement of a wide spectrum of prescriptive expectations targeting both young (young are expected to be ambitious, eager to learn, unconventional, respectful) and old (old are expected to stay active, to be generous, dignified, and wise) people. The sample comprised 133 young ($n = 58$, 50% female, $M_{\text{age}} = 26.07$ years, $SD = 3.01$) and old ($n = 75$, 44% female, $M_{\text{age}} = 66.69$ years, $SD = 4.63$) participants. We assessed implicit endorsement of prescriptive age stereotypes with the Propositional Evaluation Paradigm (PEP) and used direct measures to assess explicit endorsement. In general, we found strong support for age-specificity in both implicit and explicit endorsement of prescriptive age stereotypes: Sentences ascribing expectations for young/old to the respective age group (e.g., "young should be ambitious"; "old should be wise") were endorsed much more strongly than sentences in which expectations for young/old were ascribed to the other age group (e.g., "old should be ambitious"; "young should be wise"). Age group differences in the endorsement of pre-

scriptive age stereotypes were found only for the explicit measures, with older participants showing stronger endorsement for prescriptive beliefs targeting their own age group than did younger people. Implicit and explicit endorsement of prescriptive age stereotypes did not correlate with one another, thus revealing they might assess independent belief systems with different predictive potential.

Asymmetric boundary conditions for prevention and promotion

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Regulatory focus theory proposes two conceptually symmetrical motivational orientations: a promotion focus, concerned with nurturance, growth goals, and approaching gains, and a prevention focus, concerned with security, safety goals, and avoiding losses. While much research has focused on the broader predictions and applications of this theory, less has investigated boundary conditions for its operations. A series of five experiments (total $N = 714$) showed that regulatory focus effects on signal detection may fail to manifest under time pressure. In addition, the final experiment showed that while responses in the prevention focus group were affected by time pressure, responses in the promotion focus group were not. A further two experiments (total $N = 250$) tested regulatory focus effects on impulse buying behavior under cognitive constraint. A promotion focus increased impulse buying as expected, but only in the presence of (either) strong chronic regulatory focus. Further analyses showed that cognitive constraint abolished the moderation by chronic prevention focus, but did not affect the moderation by chronic promotion focus. Taken together, these results suggest that the mediating processes for prevention focus effects may be more resource-dependent than those for promotion focus, indicating a possible asymmetry of the cognitive architecture underlying these motivational orientations.

Attentional capture by future events: Anticipatory saccades towards salient and non-salient action consequences are influenced by individual exogenous and endogenous attention

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When our actions contingently yield predictable effects, we bi-directionally associate action and effect. Anticipating desired effects then allows us both to select and plan corresponding actions and to proactively shift our attention towards the location of our action's future effect. Such anticipatory saccades are thought to reflect a proactive effect monitoring process that prepares a later comparison of expected and actual effect. Here, we examined how the saliency (luminance, colour contrast, and flicker frequency) of future visual effects of participants' forced-choice left/right key presses influences anticipatory saccades towards them. Furthermore, we assessed individual differences in exogenous (pro-saccade) and endogenous (anti-saccade) attentional orienting in following phases of the experiment in which the salient and non-salient effect (target) stimuli occurred unpredictably at the prior effect locations. Surprisingly, participants were slower to manually

produce future salient as compared to non-salient effects and this was modulated by individual differences in exogenous and endogenous attentional orienting. Crucially, the frequency of anticipatory saccades towards participants' actions' future visual effects was modulated by interactions of action-effect compatibility, effect saliency, and participants´ individual exogenous/endogenous attentional orienting. These findings demonstrate that a person´s individual exogenous and endogenous attentional orienting can affect the proactive monitoring of their actions´ future effects and thereby impact on goal-directed action control.

Attitude similarity and interpersonal liking: A dominance of positive over negative attitudes

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Sharing attitudes leads to liking. Dating apps and other social media platforms regularly exploit this phenomenon by matching dating partners based on shared attitudes or interests. While this similarity effect is well-established, past research rarely addressed whether it matters if the attitudes are positive or negative; that is, whether positive and negative attitudes differ in their potential to elicit liking. Hence, it is unclear whether people prefer others who share their likes or others who share their dislikes. While the sparse research that has been done on this topic suggests that shared dislikes may evoke stronger liking (Bosson et al, 2006; Weaver & Bosson, 2011), we predicted that shared likes have a stronger potential to elicit liking than shared dislikes in the initial stages of impression formation. We based our assumption on principles of impression formation such as people's general preference for others who express likes over others who express dislikes (Burnstein, 1967; Folkes & Sears, 1977). In four studies ($N = 402$), we showed that likes have a stronger potential to elicit liking than dislikes. That is, participants found others who shared their likes more likable than others who shared their dislikes (Study 1). Also, participants found others who did not share their likes least likable, while not sharing dislikes was not as detrimental to liking (Study 2). We argue that three aspects contribute to this finding. First, people generally prefer likers to dislikers (Study 3). Second and third, likes are stronger and more self-revealing than dislikes (Studies 2 & 4). Our work offers novel insights into the similarity effect and has implications for dating and friendship initiation.

Attraction between multiple temporal references in duration perception

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It has been shown in a duration reproduction task that individuals can establish an internal temporal reference via learned contextual information to optimize their performance, leading to systematically biased reproduced durations. With a ready-set-go paradigm, our recent work further suggests that individuals can make use of complex contextual infor-

mation to establish and maintain two temporal references for the same physical duration. Moreover, the two references demonstrate an interesting phenomenon—the shorter reference is always attracted by the longer one. To figure out the mechanism underlying this special attraction, the present study aims to further test whether our over-learned 1 second serves as a special anchor contributing to this attraction effect. With a similar ready-set-go paradigm, we conducted three experiments, asking the subjects to reproduce a sample duration which belongs to two overlapping duration distributions, and made the 1 second located in the long distribution in Experiment 1, in the short distribution in Experiment 2 and in the middle of the two distributions in Experiment 3. The results showed that the longer reference always attract the shorter one, independent of where the 1 second is located. Our findings have disproved the 1 second hypothesis, although 1 second has been evidenced as a special reference from previous research. More work is needed to figure out the mechanism of the stable attraction effect between multiple temporal references in duration perception.

Automated driving in mixed traffic: Behavior and acceptance of motorists, bicyclists and pedestrians in interactions with automated vehicles

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In mixed traffic, automated and autonomous vehicles (AV) will interact with non-automated road users. To date, little is known about how different groups of road users behave when interacting with AVs and how mixed traffic with AVs is accepted by non-automated road users. An online survey was conducted with $N = 2048$ participants, representing motorists ($n = 683$), cyclists ($n = 673$), and pedestrians ($n = 692$) in Germany. First-person-view videos depicting scenarios involving interactions in urban traffic were shown. Using a within-subjects design, the SAE level (Lx) of the interaction partner was varied, presenting an L1/2, L3, and L4 car. Participants' behavioral intentions (go/hold) were recorded. In addition, participants were asked about their attitudes, self-efficacy, and acceptance regarding interactions with AVs in mixed traffic. A theoretical model to predict acceptance was developed and tested. The attitudes of non-automated road users toward AVs in mixed traffic can be described as indifferent. In all scenarios, participants' behavioral intentions were significantly more defensive with higher SAE level of the interacting vehicle (L1/2 $<$ L3 $<$ L4). Descriptive analyses revealed differences in the behavioral intentions of the three road user groups, depending on the design of the scenarios. Maladaptive behavior, such as disregarding the right-of-way of the interacting vehicle, was rarely observed, and even less frequently when the interaction partner was an AV. Final path analyses confirmed good fit of the theoretical acceptance model with the empirical data. Acceptance of AVs in mixed traffic was predicted very well ($R^2 = .672$), especially by confidence in AVs and the affective component of attitude. Sociodemographic variables had little effect on acceptance.

Automating experimental psychology: A proof of concept

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Experimental psychology is in the midst of a replicability crisis, fueled by limited time and monetary resources to test and integrate an increasingly large number of theories and experimental phenomena. We seek to overcome these limitations by integrating existing machine learning techniques into an open-source pipeline for the generation, estimation, and experimental validation of scientific models to explain psychological function. This pipeline is composed of two competing artificial agents: an autonomous theorist that constructs quantitative models, linking dependent measures to experiment conditions (e.g., predicting the probability that a human can detect a coherent motion among a set of moving dots), as well as an autonomous experimentalist that derives predictions from these models, and designs novel experiments to test them. The autonomous experimentalist passes data from newly conducted experiments to the autonomous theorist, which then revises its best quantitative model based on new information. Both agents leverage techniques that recently emerged from machine learning research, such as neural architecture search for automating the discovery of interpretable scientific models and active learning for automating the derivation of novel experiments. The competitive interaction between the theorist whose objective is to build models based on available data, on the one hand, and the experimentalist whose objective is to invalidate these models by collecting new data, on the other hand, implements a form of adversarial curiosity. We demonstrate that this system can recover basic models of psychophysics, learning, and decision-making from synthetic participants. We also highlight the weaknesses of this framework and discuss future directions for their mitigation.

Autonomes Fahren: Wer akzeptiert welche Lösung und warum?

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Die technische Reife autonomer Fahrzeuge ist weit fortgeschritten und erste vollautomatisierte Fahrzeuge finden den Weg auf Europas Straßen. Erste Akzeptanzstudien legen nahe, dass autonomes Fahren zwar mehrheitlich positiv bewertet wird, jedoch auch polarisiert. In der vorliegenden Arbeit untersuchten wir die Akzeptanz autonomen Fahrens in zwei europaweiten experimentellen Studien ($N_1 = 1.636$, $N_2 = 5.659$). Die Akzeptanz konnte aus den Erwartungen hinsichtlich Effizienz, Datensicherheit, Verkehrssicherheit und Umweltverträglichkeit vorhergesagt werden. Insgesamt zeigen die Studien, dass europäische Bürger:innen tendenziell positiv gegenüber autonomem Fahren eingestellt sind, jedoch Einbußen insbesondere im Bereich der Datensicherheit fürchten. Die Akzeptanz unterschied sich jedoch in Abhängigkeit untersuchter Länder, Personengruppen (sehbehinderte vs. nicht-sehbehinderte Personen) und experimentell variierter Lösungen (PKW vs. ÖPNV; Private vs. Shared Mobility).

Bayes factors for disordinal interaction hypotheses in MPT models

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Multinomial processing trees (MPTs) are stochastic models for the analysis of categorical data. MPT models are used to test theories on the architecture of various psychological processes, such as memory, decision making, and emotion processing. As MPT models are usually embedded in a strong theoretical foundation, researchers commonly make precise predictions about the effect of experimental manipulations on the MPT parameters. These predictions are often difficult to test directly, especially in the case of two-way disordinal interactions, that is, if the relationship between two model parameters in one experimental condition is reversed in another condition. We show how Bayesian hierarchical modelling can be used to construct direct tests for disordinal interactions in MPT models. Specifically, we translate theoretically derived predictions into constraints on rank orders of the magnitude of parameter estimates, i.e. specific interaction patterns. We then use Bayes factors to test the predicted rank orders. We illustrate our method by reanalyzing a study by Bell, Mieth, and Buchner (2015) on source-memory guessing, using the two-high threshold model of old–new recognition.

Bayesian advances to study individual differences with cognitive models

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University of Amsterdam

Bayesian modeling has become a popular tool to analyze data in cognitive psychology. One key challenge with this approach is how to compare models that correspond to the (hierarchical) structure of behavioral data and are theoretically informed. We illustrate this challenge by example of the implementation of individual differences in cognitive models. While individual differences are often accounted for by specifying random effects, they are rarely targets of interest. We believe that this is a missed opportunity. Using a Bayesian modeling framework, cognitive models with random effects can be used to gain a deeper understanding of cognitive architectures and individual differences in cognitive processing. Aspects of this framework that are highlighted here are hierarchical modeling, ordinal constraints, and model comparison using Bayes factor.

Bayesian comparison of hierarchical models via specialized deep learning architectures

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Hierarchical Bayesian model comparison is a frequently occurring and challenging task in cognitive modeling. Bayes factors offer a straightforward way to compare models via Oc-

cam's razor, but they require the calculation of marginal likelihoods, which are typically intractable for non-trivial models. In this talk, we propose a deep learning method for comparing arbitrarily complex hierarchical Bayesian models. In a first step, data are simulated repeatedly from the candidate models and specialized neural networks are utilized to approximate posterior model probabilities or Bayes factors on any data set arising from the models. The empirical data are only used in a second step, after the networks have learned to reliably identify the model that had most probably generated that data. Thus, our method does not require tractable likelihood functions and amortizes the initial training effort over multiple applications of the networks. Further, we argue that amortized Bayesian model comparison is especially important for a-priori determination of sample size or additional factors in computational modeling studies. Finally, we present validation studies that quantify the performance of our method on simulated data and benchmark its performance against bridge sampling. We also showcase an application to a non-trivial cognitive model and discuss potential avenues for further development.

Bayesian errors-in-variables regression to investigate unconscious mental processes

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Studies of unconscious mental processes often compare a behavioral measure (e.g., some assessment of perception or memory) with a measure of awareness (e.g., a verbal report or a recognition judgment) of the critical cue or contingency. The resulting patterns of bivariate data across subjects lend themselves to several analytic approaches for inferring the existence of unconscious processes. One such approach requires regressing the behavioral measure on the awareness measure, such that a non-zero intercept indicates behavioral change at the point of zero awareness (Greenwald, Klinger, & Schuh, 1995). However, the relationship between predictor and criterion variables is frequently biased by their low reliabilities: Measurement error in the predictor variable can attenuate the regression slope towards zero, which in turn may raise a true zero intercept above zero. A correction method in the framework of errors-in-variables regression was proposed by Klauer, Draine, and Greenwald (1998) for predictor variables with rational zero points (such as d'). We highlight the limitations of this method with reference to a set of studies by Greenwald and De Houwer (2017), apparently demonstrating the existence of unconscious conditioning—defined as a greater accuracy in rapidly classifying an unfamiliar word (US) into its semantic category after seeing a predictive cue (a masked string of consonants; CS). As an alternative method, we suggest that researchers use a generative Bayesian regression approach that (a) takes the uncertainty of the variables into account and (b) yields Bayes factors to test whether the intercept is different from zero. Reanalyzing the conditioning data shows that the new method is a valuable instrument for the toolbox of unconscious-cognition researchers.

Beauty is in the brain networks of the beholder

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Finding beauty in everyday artefacts, evaluating them, and deriving feelings of pleasure from the whole process is a universal cognitive function in humans that has been proven adaptive during species evolution. Such pervasiveness and universality of beauty judgments suggest the existence of biological substrates for them that can be systematically investigated. One of the most common everyday artefacts is music; when listening to music, even without any conscious effort or specialized education, people judge whether a musical piece is beautiful or not, namely they issue an aesthetic judgment. Up to now only few studies have focused on elucidating the neural mechanisms that govern this process, and among them, neuroimaging experiments by our and other labs identified the medial orbitofrontal brain region as robustly associated to judging either music or paintings as beautiful. For music, neural communication with the supratemporal lobe is required. Our recent magnetoencephalography research further showed that the memorization of aesthetically valuable, tonal musical patterns by J. S. Bach strengthened large-scale connections between auditory areas, basal ganglia, cingulate and hippocampal regions. In turn, the memorization of atonal, non-aesthetically pleasing patterns was related to a more focal auditory-cortex activity with lower extrinsic connectivity. Moreover, we analyzed the dynamic functional connectivity related to listening to musical patterns typically judged as beautiful with that related to listening to patterns judged as ugly and found recurrent brain states switching between auditory, orbitofrontal, insular, and striatal networks. Hence, the wide, complex interplay between brain regions seems to be the brain mechanism underlying positive appraisal during a musical aesthetic experience.

Believing repeated false information despite knowing better, even under high incentives

Christian Unkelbach & Felix Speckmann
University of Cologne

People believe repeated information more than new statements – a repetition-induced truth effect. The phenomenon has been intensively researched within the last few years, due to its potential relevance for explaining people's belief of implausible information, fake news, and conspiracy theories. However, up to know, the main dependent variables were people's beliefs. Recently, Speckmann and Unkelbach (2021) showed the effect persists even under high incentives. Here, we extend his research on the truth effect in three experiments (total $n = 605$; two pre-registered) to judgments with consequences when judges have full information about he true state of the world. In Experiments 1 and 2, participants provided binary "true"-"false" judgments for repeated and new information while valid advice about the factual truth of the information was provided. Importantly, half of the participants could earn (lose) 10 cent for each correct (incorrect) decision. Despite given advice that information was false and given monetary incentives, repeti-

tion nevertheless increased the likelihood to judge information as "true". Experiment 3 again incentivized decisions, and participants could actively ask for advice at the cost of 5 cents for getting valid advice. If participants asked for advice, the truth effect vanished. However, participants were significantly less likely to ask for advice about repeated information and if they declined advice, the rated of "true" judgments was substantially increased. Together, these findings underline the repetition-induced truth effect's relevance, as people show the effect despite costs for themselves.

Beneficial effects of drinking alcohol following learning on subsequent memory: A registered conceptual replication

Julian Quevedo Pütter & Edgar Erdfelder
University of Mannheim

Post-encoding alcohol consumption has been shown to enhance performance on a subsequent memory test (Parker et al., 1981). Although this so-called retrograde facilitation effect is treated as a robust phenomenon in the literature, most replication studies have neglected possible confounds such as interpolated sleep. Moreover, previous research failed to differentiate empirically between two different hypotheses proposed to explain the effect: the interference and the consolidation hypothesis. According to the interference hypothesis, acute alcohol intoxication reduces retroactive interference for the previously encoded information. In contrast, according to the consolidation hypothesis, consolidation of the previously established memory traces is enhanced during acute intoxication. To resolve these open research questions, we conducted a registered conceptual replication study that crucially avoids periods of sleep during the retention interval. Moreover, we applied the encoding-maintenance-retrieval (EMR) model (Kuepper-Tetzel & Erdfelder, 2012), a multinomial processing tree (MPT) model that allows to disentangle consolidation and retrieval contributions to the retrograde facilitation effect. In our view, this study is a prime example for how applying advanced statistical modeling techniques can help evaluate cognitive theories that differ in their predictions concerning storage and retrieval of previously learned information.

Beyond behavior: Using neuroscientific data to constrain cognition models

Jelmer Borst
Rijksuniversiteit Groningen

Cognitive models are notoriously hard to evaluate, in particular when relying on behavioral measures exclusively. In this talk, I will argue on the basis of three examples that neuroimaging data can be very valuable, and, in fact, might be required to test cognitive models properly. First, I will show that reaction times are insufficient to constrain cognitive models: a machine-learning analysis of EEG data showed that internal cognitive stages varied between experimental conditions in a task, without affecting overall RT. This problem is emphasized by a second example, in which behavioral predictions of an ACT-R model were almost perfectly matched by the data, while fMRI predictions of the

same model were clearly incorrect. Finally, the third example shows how these problems translate to low-level brain models: even though a spiking-neuron model accounted for behavior in an associative recognition task, source-localized MEG data showed how the memory part of the model was based on wrong assumptions. Taken together, these examples show that relying on reaction times and error rates is often insufficient to account for the mechanisms that we use in our models, whether they are high-level ACT-R models or low-level brain models.

Beyond the incident – a paradigm for the research on perception of systemic discrimination

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Although there have been major advances in discrimination-perception research in recent decades, the phenomena observed in this area often lack explanations on a process level. The present research introduces a paradigm that may help to fill this knowledge gap. We argue that current research methods in this field suffer from limitations that hamper investigation of underlying psychological processes: 1) A lack of objective measures of the actual severity of discrimination; 2) little control over alternative explanations for different treatments of multiple groups beyond discrimination (e.g. performance); 3) a lack of sequential presentation modes that enable investigating sampling-processes that resemble real life settings. To overcome these limitations, the present research introduces the Discrimination in Sequence and Tables (DiSaT) Paradigm that builds a bridge between causal-reasoning research and discrimination-perception research. In this paradigm, information on discrimination is presented either in a table or a sequential format, in which an approximation of the actual severity of discrimination can be derived from the given information. Four experiments ($N = 779$) demonstrate that discrimination can be manipulated and perceived at several levels of severity in the DiSaT-paradigm. Participant judgments correlated with the objective discrimination severity. We also observed important differences between three alternative measurements of discrimination perception concerning their accuracy and ability to deal with the alternative explanations. Potential areas of application as well as remaining questions concerning the paradigm are discussed.

Binding and retrieval of spatial and temporal features of planned actions

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According to the BRAC framework, action planning relies on binding codes of the relevant action features. Such binding is indicated by the observation that planning a novel action is impaired if it shares some, but not all, features with another action that is held in memory for later execution. In the typical paradigm, participants plan a rather complex series of keypresses with one hand, but, before executing it, plan and execute a simple keypress with the same (partial feature overlap) or the other hand (no feature overlap).

Here, only the features left and right can be shared between the two action plans. Using an online paradigm with simple keypresses only, we were able to replicate these findings of binding effects for horizontal features as well as extend them to temporal (short and long) and vertical (top and bottom) features. Two important observations were made. First, we found a robust effect of uncertainty on binding. Generally, when action features remain uncertain until the stimulus demanding that action appears, then these features have better chances of being bound than when they are known already from the start of the experiment. However, in the latter case, features may still be bound despite their certainty, and whether they are seems to depend on the feature type. Second, we found a robust repulsion effect between the two action plans. Specifically, within the possibilities of the task, the execution of action features was shaped in a way that these features are distinguishable from identical features held in memory for another subsequent action. For instance, with a short keypress planned for later execution, an intermediate keypress will be longer than with a long keypress held in memory.

Binding effects in episodic memory – a systematic comparison of five modeling approaches

Marcel Raphael Schreiner & Thorsten Meiser
University of Mannheim

Representing an experienced event in memory requires the binding of its constituent elements. This leads to a stochastic dependency of the retrieval of event elements such that the likelihood of retrieving an event element is related to the likelihood of retrieving another element from the same event. Several statistical modeling approaches can be used to analyze such dependencies. Here we compared the performance of a newly proposed approach based on item response theory and a nonparametric variant of this approach, the contingency-based approach by Horner and Burgess (2013) and two related approaches based on Yule's Q and an adjusted Yule's Q. The approaches were compared regarding Type I error rates and power for detecting stochastic dependencies, differences in dependencies, and their susceptibility to different levels of memory performance. Additionally, the approaches were applied to empirical data to compare empirical inferences. Results indicated the approaches using Yule's Q to be unsuitable for modeling binding effects in episodic memory. The approach based on item response theory performed best, yielding high power and good maintenance of Type I error rates.

Binding of task-irrelevant cue features in cued language-switching

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The processes underlying language control are often investigated through language switching paradigms. Previous research suggested considerable overlap in control mechanisms in language switching and task switching. Thus, as feature binding and retrieval processes are likely to play a crucial role in task switching performance, we expect that feature

binding and retrieval also influences language control. In the present study, we use a picture-naming language-switching paradigm, in which the currently relevant language is indicated by a symbolic cue that is presented either visually or auditorily. In two experiments ($N = 43$ and $N = 46$), we find evidence that the irrelevant cue modality (auditory vs. visual) is bound with the language and retrieves it when the cue modality repeats in the subsequent trial. That is, language repetition benefits are larger when the cue modality repeats than when it switches. Further, in the second experiment, the data indicate a trend towards larger binding and retrieval effects with low-frequent words as compared to high-frequency words. Taken together, these results suggest that binding and retrieval mechanisms interfere with language control processes and that such interference is modulated by the frequency of use (i.e., practice) for each word. We discuss implications of the interaction between language control, language proficiency, and short-term features bindings.

Black & white vs. shades of grey: Categorical vs. dimensional representations of stimuli as a disposition

Lea Sperlich, Felix Speckmann, & Christian Unkelbach
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People are surrounded by circumstances that allow them to classify the world in distinct categories (e.g., male vs. female, bad vs. good), or to mentally structure it on a continuum (e.g., from extremely masculine to extremely feminine). We hypothesize that the tendency to structure stimuli categorical or dimensional may be a trait that is independent of motivational tendencies such as need for cognition or need for structure. To test this assumption, participants arranged stimuli in a spatial arrangement (SpAM) task according to their (dis)similarity. We then correlated the results of the SpAM task with the reaction times from a second task where participants had to classify the same stimuli as belonging to one of two categories (e.g., colors should be classified as blue or green, respectively). People who perceive stimuli as more similar should cluster them stronger (i.e., categorize them) and thus, the evaluation of the stimuli should be faster. Indeed, we found that categorization tendency predicted classification latencies. Thus, participants who clustered the colors stronger were faster in classifying green as green and blue as blue. In follow-up studies, we will test if this effect generalizes to other stimuli (e.g., pictures of emojis, plants, vertebrates). In addition, we aim to show that motivation does not influence categorization by measuring the explicit preference of highly clustered vs. lowly clustered arrangement solutions. If we cannot find a difference in preference between both patterns, this is a first evidence against a motivational explanation. This potential personality variable may for example predict interindividual differences in stereotyping and prejudice, independent of other personality variables (e.g., Social Dominance Orientation).

Bound to a spider without its web: Task type modulates response executions being influenced by preceding affective information

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When responding to a stimulus, action control theories assume response and stimulus features to be integrated into a short episodic memory trace. Repeating any component spurs on retrieval, affecting subsequent response executions. While being reliably observed in non-spatial discrimination tasks, such "binding effects" are typically absent when detecting or localizing a stimulus appearing somewhere; here, usually only a location change benefit emerges, that is, inhibition of return (IOR). Valence has been found to modulate action control processes. In contrast, research on the modulating role of valence on IOR has led to mixed results, with many finding no influence at all. In the current study we tested 1) if task-irrelevant valence is bound to the response and affects subsequent responses due to retrieval, and 2) if the lack of binding and retrieval in localization tasks is responsible for IOR often being unaffected by affective information. Participants discriminated letters (Experiment 1) or localized targets (Experiment 2) on a touchpad in prime-probe sequences. Crucially, during the prime display two images – fruits and spiders – appeared on the touchpad, one of which spatially congruent with the to-be-touched area. In the discrimination task, previously touching a spider compared to a fruit slowed down response repetitions, while the opposite pattern emerged for response changes. In contrast, the localization task only showed IOR. We conclude that 1) task-irrelevant valence is integrated with the response, affecting subsequent responses, and 2) that this is not ubiquitous but depends on task type. The results shed further light on the impact of affective information on actions and offer a possible explanation for an often absent modulation of IOR by valence.

BRAC goes social: Retrieval of observational stimulus-response bindings in online settings

Carina G. Giesen
Friedrich Schiller University Jena

Observing how another person responds to a stimulus results in observationally acquired stimulus-response (SR) bindings. These can be retrieved from memory on later occasions, which means that observed responses are utilized for regulating one's own actions. Until now, evidence for storage and retrieval of observationally acquired SR bindings was limited to dyadic interactions between two interaction partners who respond in alternating fashion. In two highly powered, pre-registered studies, I demonstrate for the first time that observational SR bindings can also be acquired in online interactions: Robust retrieval effects emerged when observers believe to be interacting with another person. In turn, retrieval effects were absent when observers believe to be interacting with the computer. The findings show that feature-based binding and retrieval principles are pervasive and also apply to social interactions, regardless of real-life or online.

Bribery within and across borders – experimental evidence on conditional bribery from 21 nations

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Curbing corrupt behavior like bribery presents a global grand challenge that increasingly spans national borders. Designing more effective anti-corruption policies requires understanding the behavioral underpinnings of bribery. To provide first behavioral insights into bribery within and across borders, we ran large incentivized online experiments using a bribery game with representative samples from 21 nations (total $N = 6,472$) across six continents. Results uncover differences between nations concerning the propensity to offer a bribe. Furthermore, indicative of what we label "conditional bribery" – people offered bribes to interaction partners from nations with a reputation of being corrupt. Expectations about a nation's openness for bribery are shared across the participating nations but negatively correlate with reality.

Bypassing cognitive control in urgent situations: The role of arousal

Christian H. Poth
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Cognitive control enables humans to act guided by goals, even despite action tendencies prompted by the environment. For saccadic eye movements, it has recently been shown that cognitive control is circumvented in urgent situations. In a time-window before a response under time-pressure, participants could not help but look at a suddenly appearing visual stimulus, even though their goal was to look away from it (an "antisaccade"). We discovered that this phenomenon extends beyond saccadic eye movements and also occurs in manual tasks of cognitive control (the spatial Stroop task and the flanker task). In addition, we found that different response deadlines used to induce time-pressure also affected markers of physiological arousal. That is, with increasing time-pressure, the pupil size and the peak velocity of spontaneous saccades increased. Based on these findings, we speculate that urgency helps stimulus-driven behavior to overcome cognitive control by increasing the momentary level of arousal.

Can associated stimuli indirectly retrieve a response from another paired stimulus? A test for transfer of associations and indirect retrieval using a contingency learning task

Mrudula Arunkumar, Klaus Rothermund, & Carina G. Giesen
Friedrich Schiller University Jena

If a stimulus is contingently paired with a particular response, this impacts on performance and typically yields benefits (costs) for contingent (noncontingent) stimulus-

response pairings. Contingency learning can be explained by stimulus-based episodic retrieval of past responses. However, it is yet unresolved whether response retrieval can also be triggered by another stimulus that was never directly paired with the response, but is only associated with the former stimulus. From the classical conditioning literature, this is demonstrated by the concept of sensory preconditioning. We investigated the phenomenon of indirect retrieval in a contingency learning paradigm. Phase I: Two words were associated with each other (S1-S2 pairings). Phase II: S2 was contingently paired with a response (S2-R pairings). Phase III then tested contingency learning for S2 (manipulation check) and S1 (test for indirect retrieval) in a forced-choice task (study 1) and a free-choice task (study 2). We will discuss the findings of our studies, which will further extend our understanding of the cognitive mechanisms underlying learning effects.

Can conditionals explain explanations? A modus ponens model of "b because a"

Simone Sebben & Johannes Ullrich
University of Zurich

We suggest a normative model for the evaluation of explanations B because A based on probabilistic conditional reasoning and compare it with empirical data. According to the modus ponens model of explanations, the probability of B because A should equal the joint probability of the conditional if A then B and the explanans A. We argue that B because A expresses the conjunction of A and B as well as positive relevance of A for B. In Study 1, participants ($N = 80$) judged the subjective probabilities of 20 sets of statements with a focus on belief-based reasoning under uncertainty. In Study 2, participants ($N = 376$) were randomly assigned to one of six conditions for which we varied the inferential relevance of A for B to assess boundary conditions of our model. We also report results on the Equation, a fundamental model in research on probabilistic reasoning concerning the evaluation of conditionals. In both studies, results indicate that participants' belief in statements B because A followed model predictions systematically. However, a sizeable proportion of sets of beliefs contained at least one incoherence, indicating deviations from the norms of rationality suggested by our model. In addition, results of Study 2 lend support to the idea that inferential relevance may be relevant for the evaluation of both conditionals and explanations.

Can physical warmth buffer against the negative effects of social exclusion? A comparison between women with and without childhood trauma

Vivienne Hug, Elena Heitz, Rahel Federer, & Susanne Fischer
University of Zurich

Feelings of social disconnection are a key feature of some of the most frequent mental disorders. Accumulating research suggests that the thermal system may be intertwined with how connected individuals feel with their social environment. The aim of our experi-

ment was to investigate whether physical warmth can alleviate feelings of social exclusion and whether this effect is moderated by the presence of childhood trauma. To this end, $n = 31$ healthy women were randomly allocated to a warm or a neutral temperature condition (target $N = 86$). Childhood trauma was assessed via the Childhood Trauma Questionnaire (CTQ). To induce feelings of social exclusion, all participants underwent the Yale Interpersonal Stressor Task (YIPS). Negative affect was measured before and after the YIPS. Our preliminary analyses revelaed that physical warmth did not alleviate the negative affect experienced after social exclusion in the total sample ($F(1, 29) = 0.22$, $p = .645$). However, women with childhood trauma reported a greater reduction in their negative affect after physical warmth stimulation compared to women without experiences of childhood trauma ($F(1, 27) = 3.02$, $p = .093$, $\eta_p^2 = .101$). The final results will be presented at the conference. Should we be able to confirm that physical warmth can attenuate feelings of social disconnection, our findings could inform the development of novel treatments for individuals who suffer from interpersonal difficulties.

Can source trustworthiness moderate the effects of repetition and contradiction on judgments of truth?

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ISCTE – Lisbon University Institute

People tend to believe in information they repeatedly encounter, an effect known as repetition-based illusions of truth. In addition, people reject claims contradicting previous information, giving rise to illusions of falseness associated with contradiction. These effects pose a challenge to the attempts to update or correct false information that has been encoded before and contribute to the continuous dissemination of misinformation. In this talk, we will present a set of studies testing whether the presence of cues about the (un)trustworthiness of information sources can moderate the effects of repetition and contradiction on judgments of information's truth-value. In the first group of studies, trustworthiness was manipulated by asking participants to play several rounds of a Trust Game with trustworthy vs. untrustworthy partners, who later were introduced as the sources of the repeated and contradictory messages that had to be judged for truth. In the second group of studies, trustworthiness was manipulated through the facial features of the sources. We hypothesize that untrustworthy sources will trigger a deeper scrutiny of information, counteracting the intuitive acceptance of repeated messages and the rejection of contradicting messages.

Causal effects of attention on probability weighting

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Various biases in real-world decision making, such as buying overpriced insurances or lottery tickets, indicate that people do not weight the outcomes of risky options according to their objective probabilities. Instead, they seem to overweight unlikely outcomes, and underweight outcomes with medium to high probability. This has also been demon-

strated in various classical lab experiments on risky choice. Cumulative prospect theory formalizes this tendency in terms of an inverse S-shaped probability-weighting function. Although this function elegantly describes behavioral patterns, it does not explain which psychological mechanisms give rise to the tendency to under- or overweight probabilistic outcomes. Here we test if nonlinear probability weighting can be causally explained by asymmetries in attention allocation preceding a choice. In a preregistered, incentivized online experiment ($N = 500$), we manipulated attention allocation (within subject) in a passive sampling paradigm. On each trial, participants viewed sequential samples from a safe and a risky option. Across three conditions, we manipulated the proportion of samples from the safe vs. risky option the participants were exposed to. When we made participants attend more the the safe (versus risky) option, they became more likely to choose this safe option, and vice versa. Moreover, when inducing attentional biases to the safe (risky) option, the weighting function tended to be less (more) highly elevated and more convex (concave). By making participants attend to both options approximately evenly, we could induce an almost objective weighting of probabilities. Thereby, the current results provide evidence for causal effects of pre-decisional attention allocation on both choice behavior and probability weighting.

Challenges in modeling situation awareness and criticality estimation in driving based on a video-study: An ACT-R model

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Determining the criticality of a traffic situation is a basic task that has to be accomplished in driving. Several theories assume that human drivers' evaluation of the criticality of a dynamic traffic situation is mostly determined by the time-to-collision (TTC). We are developing a cognitive model using ACT-R to shed light on the complex cognitive processes that underlie situation awareness in a highly dynamic traffic scenario, in order to determine how participants evaluate the different conditions as critical or not. Our model aims to replicate empirical data from a video-study in which participants watched a potentially risky lane-change scenario and were instructed to rate how critical the situation was, and to select which action they would prefer to choose at the end of the scenario (i.e., accelerating, decelerating, maintaining speed; Stoll et al., 2018). The model observes the scenario and establishes a projection (about another road user's position, trajectory, etc). As the driving scenario develops, the model checks whether the current projection is still valid, and in case it is not, a new memory retrieval takes place to adjust situation awareness. Importantly, according to our reasoning, drivers' criticality evaluation is not a result of mere TTC perception, but of memory retrieval of past scenarios that help drivers to interpret the situation and make projections about its outcome. Moreover, we argue that other relevant road users and their situation (e.g., goal and intention) are taken into account during the criticality estimation process. With other words, we suggest that the driver's situation awareness includes the representation of other road users' situation awareness as well, to a certain extent.

Challenging current theories for subjective time dilation

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Stimuli that attract more attention, such as novel or dynamic stimuli versus static stimuli, have been shown to prolong subjective time perception. However, the subjective time dilation effect, in which a dynamic novel stimulus is only perceived to last longer when expanding in size but not when shrinking, requires further explanation. Popular theories include the ecological theory, which proposes that looming (expanding) targets are evolutionarily "threatening" to a viewer as they seem to be approaching the viewer, thus inducing more arousal in the viewer than receding (shrinking) targets which seem to be moving away from the viewer and thus do not pose a threat; theories based on easier attention capture; and a theory of magnitude (ATOM), which proposes that sensory, spatial and temporal perception share a common system of magnitude. In the current study, we explored the possible influence of expanding targets' luminous flux (surface area × brightness) in subjective time dilation and found that the time dilation effect persists even when the expanding target is hollowed out or increases in brightness, but disappears when it decreases in brightness. Moreover, we found that when the relative initial and starting sizes of expanding and shrinking stimuli compared to the static stimulus are manipulated, both expanding and shrinking stimuli can show temporal expansion. These findings pose a challenge to existing theories. We propose that change itself, rather than its direction and the associating semantics, may be the primary cause of attention capture in temporal distortions.

Changes in time? Temporal referencing of Spanish-English bilinguals in two language contexts

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In many languages speakers use spatial terms and concepts to talk about time or to depict relations between temporal events. For example, we can move a meeting forward or place a historical incident on a timeline in front of or behind other events. Languages vary, however, in the way spatial concepts are mapped onto time. English and Spanish both possess linguistic expressions that associate the spatial concepts of front/forward and back/backward with temporal entities, such as future and past or earlier and later. Whether "front" is assigned to earlier or later points in time depends on individual and mutually shared referencing preferences of a speech community. The present study investigates to what extent temporal referencing preferences of Spanish-English bilinguals depend on the current linguistic context and/or on the relative language dominance. Applying variations of the "Wednesday's meeting paradigm" and other temporal tasks, temporal references were assessed for 106 Spanish-English bilinguals in an English and Spanish language context. Language dominance was measured using self-rated language skills and validated by a language performance test in both languages. Overall, the preferences for the assignment of front to either the past or the future replicated previ-

ous findings for monolinguals in both languages. In addition, language dominance and language context both influenced the observed referencing preferences in that referencing patterns typically observed for Spanish were more frequent for dominantly Spanish speaking participants and more pronounced in the Spanish than the English language context. Our results suggest that temporal referencing depends on the current linguistic context and partially on the relative language dominance of speakers.

Characterization of the ongoing electrophysiological activity of the planarian *Schmidtea mediterranea*

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Kiel University

Comparative cognitive science currently strives to examine peak performance in different species. To successfully reproduce biological intelligence in artificial intelligence, it is more constructive to examine the cognitive functions of lower animals. A first step into this direction is the characterization of the ongoing electrophysiological activity. This will then allow testing activity patterns related to stimulus processing and cognition, as well as the reproduction of these patterns in artificial neural networks. Here, we examine the neural activity of the flatworm *Schmidtea mediterranea*, whose nervous system is organized in quantitative dimensions which could be artificially reproduced right now or in the near future. Planarians have successfully survived for 800 million years, and they are the closest living relatives to the original bilateralians, the first animals with two distinct hemispheres and a well-defined movement direction. They are the first animals to develop a head with a central hub of the nervous system in the form of cerebral ganglia and thus a direct precursor of our brain. A previous study (Aoki et al., 2009) used invasive monopole recordings in cooled planarians, and observed ongoing activity between 0.1 and 5 Hz with a power spectrum characterized by a $1/f$ relationship. We extend this observation by recording ongoing electrophysiological activity from noninvasive surface electrodes at room temperature. This procedure allows continuous recordings across longer intervals, and repeated recordings from the same animals without harming the animals to study changes in neural activity linked to stimulus processing and cognition.

Chicken or egg? The role of awareness in long-term learning by repeated exposure

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One of the best-known demonstrations of long-term learning through repeated exposure in working memory is the Hebb repetition effect: Immediate recall performance improves for lists presented repeatedly as compared to non-repeated lists. This effect is often understood as an implicit learning effect, not requiring any awareness of the repeated list. In contrast, recent studies have found that solely participants who reported to have noticed a repeated list improved with repetition. Here we ask whether participants reported awareness after learning the list or whether awareness preceded learning. We

assessed both, memory performance and awareness, on each trial: Participants were presented with 120 visuo-spatial arrays composed of 6 colors, one of which was repeated on average every 4th trial. After each trial, we measured (1) working memory performance and (2) participants' assessment of whether the presented array had been shown before. By fitting a preregistered Bayesian hierarchical mixture model to both, the memory and the awareness data, we were able to (1) classify if a participant became aware of / learned the repeated array and (2) measure the timepoint in the experiment when awareness and when working memory performance started to increase. The results suggest that awareness increased earlier in time than learning, indicating that detecting the repetition preceded learning. We discuss implications for the interaction of working memory and long-term memory as well as potential limitations to the visual memory material used in the experiment.

Chimpanzee and human risk preferences show key similarities

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Risk and uncertainty are central to all adaptive decisions human and nonhuman animals make – including when deciding where to forage, with whom to mate and how to deal with dangerous situations. Risk preference determines how agents decide in face of these hazards and is a crucial determinant of life outcomes such as health, wealth, and wellbeing. Yet, the biological underpinnings of this important building block of behavior remain unclear. Here, we investigated the extent to which chimpanzees' (Pan troglodytes) exhibit risk preferences that are in important respects isomorphic to human risk preferences. Chimpanzees are an ideal reference: they are one of humans' two closest living relatives, live in large, mixed sex social groups and have similar developmental stages with a long infant dependency, a period of adolescence and a long life expectancy of up to 50 years. Using a multimethod approach we studied chimpanzee ($N = 86$) risk preference across domains and measurements. Our results show that chimpanzees' willingness to take risks shares structural similarities with that of humans across four key dimensions: chimpanzee risk preference manifests as a trait-like preference that is consistent across domains and measurements, chimpanzees are ambiguity averse, males more risk prone than females and that the appetite for risk taking follows an inverted U-shaped relation to age. Our findings suggest that key dimensions of risk preference emerge independently of the influence of human cultural evolution and thus may have deeper phylogenetic roots than previously suspected.

Choice biases and control adjustments in task switching

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Conflict in task switching can bias decision making. In a recent paper (Schuch & Dignath,

2020), we reported that conflict between competing task-set representations (as it occurs in $N-2$ task repetition sequences) biases task choice away from the conflict-associated task. This observation extends previous findings that response-conflict within a task leads people to switch away from this task (Dignath et al., 2015, 2020). Hence, if given free choice, people tend to avoid tasks in which they have experienced conflict, possibly due to the aversive nature of cognitive conflict. If free task choice is not possible, conflict leads to an upregulation of cognitive control, as evidenced by better performance after high task-conflict (i.e., after $N-2$ repetition sequences; Schuch & Grange, 2015, 2019), and after high response conflict (Dignath et al., 2015, 2020). Taken together, these studies illustrate interesting links between cognitive control, affect, and decision making.

Choice of task characteristics shields against music and noise stimulation effects on effort

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Two experiments tested whether personal choice vs. external assignment of task characteristics moderates the effect of (1) affect-inducing music and (2) aversive noise simulations on effort-related cardiac response. We expected strong action shielding and low receptivity for both types of external stimulation when participants could personally choose themselves the stimulus color of an easy cognitive task. When the stimulus color was externally assigned, we predicted weak action shielding, resulting in (1) affective influences on effort due to affect's informative effect on experienced task demand, and (2) noise influences on effort due to the noise's distractive and obstructive nature. Results supported our hypothesis in both studies. Participants in the assigned task characteristics condition showed stronger cardiac pre-ejection period reactivity when (1) exposed to sad music than when exposed to happy music and when (2) exposed to aversive noise stimulation than when exposed to no noise stimulation. These music and noise effects did not appear among participants who could choose the stimulus color themselves. Our results replicate previous research by showing that personal choice leads to shielding against incidental affective influences on action execution, whereas individuals remain receptive for affective influences during volition when task characteristics are assigned (Study 1). Further, we were able to extend these findings for the first time to the effect of aversive noise stimulation (Study 2).

Clarity of task demand moderates the relationship between (implicit and explicit) achievement motive strength and (physical and mental) effort

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The traditional motive literature suggests that motives exert a direct influence on the

effort that individuals invest in cognitive and physical tasks: The stronger the motive, the higher the effort. We will present four studies that challenge this assumption by demonstrating that the relationship between motive strength and effort is a function of clarity of task demand. Studies 1 ($N = 40$) and 2 ($N = 78$) assessed participants' explicit achievement motive (sanAch) strength using the achievement scale of the Personality Research Form and examined the impact of sanAch strength on the force exerted in a hand grip task (Study 1) and on sympathetic-driven cardiovascular responses during the performance of a mental arithmetic task (Study 2). In both studies, participants were either informed in advance about the difficulty of the task or not. Studies 3 ($N = 68$) and 4 ($N = 88$) examined the impact of implicit achievement motive (nAch) strength—assessed using the Picture Story Exercise—on cardiovascular responses during the performance of mental arithmetic tasks that varied either in task difficulty (Study 3) or in clarity of task difficulty (Study 4). The results of studies 1, 2, and 4 showed that achievement motive strength only directly determined effort if task difficulty was unclear. If task difficulty was clear, motive strength had no impact. Study 3 revealed that achievement motive strength determined the maximum amount of effort that individuals were willing to invest in a task with known task difficulty, but not how much effort they invested in the task. In sum, the findings of the four studies suggest that the achievement motive only exerts a direct impact on effort if task difficulty is unclear, but not if task difficulty is clear.

Classics in virtual reality: Implementing visual perception paradigms in VR

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Technical University of Kaiserslautern

Advances and easier accessibility of virtual reality (VR) technology are opening up new opportunities for researchers to conduct laboratory experiments under more ecologically valid yet controlled conditions. In the current study, we investigated the feasibility of utilizing virtual reality in experimental psychology using classical experimental settings such as the Eriksen's Flanker task and a response priming task with basic geometric shapes. Our goal was to compare the task performance in virtual reality to that of the desktop version. Preliminary results for the flanker task are in line with behavioral patterns reported in the literature, with inconsistent trials being slower compared to neutral and consistent trials in both versions of the task. Furthermore, participants performed faster in VR in all comparative conditions. This talk aims to illustrate that VR can be a viable medium for conducting psychological experiments. It also discusses the viability of VR controllers in psychological research.

Cognitive control mechanisms in a reading task involving semantic ambiguity

Nicoletta Simi[1], Ian Grant Mackenzie[1], Hartmut Leuthold[1], Markus Janczyk[2], & Carolin Dudschig[1]

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Cognitive conflict is seen as a crucial factor in triggering subsequent adjustments in cognitive control. Studies have suggested that the implementation of control following conflict detection might be domain-general in that conflict experienced in the language domain recruits control processes that deal with conflict experienced in non-linguistic domains. During language comprehension, humans often must recover from conflicting interpretations as quickly and as accurately as possible. In the present study, we investigate how people adapt to conflict experienced during processing semantically ambiguous sentences. Experiments 1–3 investigated whether semantic conflict produces CSEs within a subsequent Stroop task and whether Stroop conflict leads to adjustments in semantic processing. Experiments 4–6 investigated whether such semantic conflict results in conflict adaptation in subsequent sentence processing as reflected by the congruency sequence effect (CSE). Although processing conflict was consistently experienced during sentence reading and in the Stroop task, and in control blocks conflict adaptation was observed within the manual Stroop task, we did not observe any within-task or cross-task adaptation effects. Specifically, there were no cross-task CSEs from the linguistic task to the Stroop task and vice versa (Experiment 1–3) – speaking against the assumption of domain-general control mechanisms. Moreover, experiencing conflict within a semantically ambiguous sentence did not ease the processing of a subsequent ambiguous sentence (Experiment 4–6). We argue that the present zero control on language processing must be interpreted with caution since the timing of when conflicting information is presented and the type of conflict might be critical.

Cognitive functions for cooperation with artificial intelligence in a game setting

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Knowledge Media Research Center (IWM)

A lot of work is currently done on creating agents that are more adaptive towards the behavior of their human partners. These agents are generally trained by playing thousands of episodes cooperatively with themselves. That leads to problems when they are faced with a partner that does not act in a way the agent can foresee, like a human. In a cooperative game, it is vital that both partners can learn and adapt to what the other does. In work on the adaptability of agents, the fact that humans adapt to the agent too is widely ignored for good reasons. But it is an interesting question nonetheless: How does a human adapt to the behavior of an agent in a cooperative game? We created an experimental paradigm in which the participants play a cooperative version of the famous game Tetris together with a bot. The collaborative element is added by giving one partner the responsibility to choose a piece and the other to place it according to the Tetris rules. In the first experiment, the bot selects the pieces. It follows strict rules and does not alter its strategy to harmonize better with the human. That allows the human participant to learn the rules of the bot implicitly throughout many rounds. We test this by letting the participants predict the action of the bot. We assume that if the participants understand the bot, they should be better at predicting its choices than a

control group with a randomly acting bot as a partner. This hypothesis is confirmed in an experiment on $N = 87$ participants. In this experiment, we also show that while the group that has the smart bot as a partner is learning to anticipate the bot's actions, they gain no explicit knowledge of the rules it follows. We will discuss, whether this process is similar to social learning processes.

Cognitive modeling and neuronal data for mental spatial transformation

Linda Heimisch & Nele Russwinkel
Technical University of Berlin

Besides the great contributions that behavioural experimental data have made in the past for cognitive modeling (and vice versa), there is an increasing effort to turn to neuronal data for the experimental validation of cognitive models in order to gain a deeper understanding of the cognitive processes in question. Especially the high temporal resolution of EEG data opens up great possibilities for evaluating cognitive models on a fine-grained level. On the other hand, cognitive models offer functional explanations for EEG data patterns that often lack a direct interpretation with regards to cognitive content. We give an introduction to bringing cognitive models in the ACT-R architecture with EEG data using the HsMM-EEG method which allows the identification of single cognitive processing stages in task solving processes. We demonstrate the methodology on several tasks that study mental spatial transformation and show how the model predictions and the information that the HsMM-EEG method provides about the temporal structure of cognitive processing stages can be brought together for research on higher-order cognition.

Cognitive shifting in the presence of others

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Performance on the control inhibition cognitive tasks, as the Stroop task, showed a reliable difference between alone and social presence conditions. These results have been interpreted in the light of different theories of social facilitation that involve selective attentional processes at different moments of the processing (preventing the attentional resources from being allocated to task-irrelevant stimuli-features) and resolution of the response conflict. However, few data and mixed results exist for other tasks that involve executive functions. In this study, we tested the effect of the presence of others on another executive function associated with the ability to shift processing between tasks or mental sets. Cognitive control in shifting tasks involves controlling attention to allocate attentional resources to perform the task-relevant to the current goal. We assess individual's performance in isolation and in co-action in 3 different shifting tasks that require to switch between two sets of instructions and execute the correct task in response to a cue, the Color-Shape Task with a pre-stimulus cue (proactive attention), and Number-Letter Task and Local-Global Task with stimulus dimensions as cue (reactive attention). Results show differences in how the presence of others impacts performance, measured

as the switch-cost calculated for accuracy, reaction times and temporal dynamics (i.e., delta plots) at a level of blocks and trials. Results show that in the presence of others, participants present a lower switch-cost in the Color-Shape Task, as opposed to the Number-Letter Task; Local-Global Task results are mixed. We discuss the results in light of different theories of social facilitation and processing differences associated with these tasks.

Colour and contour features convey emotions in abstract visual artworks

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Visual abstract art is often used to convey feelings and emotions through the manipulation of colour and form. Here, we investigated how colours and lines are used to express emotions through art. A secondary question was whether artists and non-artists express emotions through art in similar ways. In our study, 46 artists and 45 non-artists each created abstract colour drawings and line drawings depicting six emotions (i.e., anger, disgust, fear, joy, sadness, and wonder). To determine whether emotions are depicted in common ways across individuals, we computationally predicted the emotion of a given drawing by comparing it (i.e., pixel-wise correlation) to a set of reference drawings created by averaging across all other participants' drawings within each emotion category. Prediction accuracy was above-chance in all cases, but was higher for colour drawings (accuracy = 43.8%) than line drawings (23.6%, $p < .001$), and for non-artists' drawings (36.9%) than artists' drawings (30.6%, $p < 0.05$). Additionally, in a separate behavioural experiment, we found that people ($N = 242$) could also accurately infer emotions, showing the same pattern of results as our computational predictions. Further analyses of the drawings revealed that there are systematic commonalities in colour and line usage when depicting an emotion, and differences across emotions (e.g., anger is generally red, and more densely drawn than other emotions). We also found that artists tend to use darker lines and fewer colours than non-artists to depict emotions. Taken together, these results imply that abstract colour and line drawings convey certain emotions based on their visual features, which are also used by humans in the production and appreciation of abstract artworks.

Combined visual-auditory fear-related stimulation delays the disengagement of spatial attention from an invalidly cued position: An ERP study

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Spatial shifts of attention evoked by a peripherally presented visual or auditory cue can be enhanced by adding fear-related content, such as the picture of a face displaying an anxious expression or a fearful vocal sound, compared with emotionally neutral cue stimuli

(Zhang et al., 2017; Zimmer et al., 2016). We investigated this "emotional enhancement" of attentional cueing by presenting redundant visual-auditory cues (i.e., a neutral or fearful face together with a neutral or fearful voice, located on the same side) which preceded an (emotionally neutral, visual) target stimulus, displayed on the same side (i.e., valid cueing condition) or on the opposite side (i.e., invalid cueing condition) and recorded attention-related ERPs (i.e., P1, P3). In reaction times, a typical cueing validity effect was only observed when both cues were related to fear. Corresponding with this behavioral effect, the P1 displayed a maximum difference between valid and invalid trials in the "both cues fearful" condition. A main effect of validity in the P3a component (i.e., larger P3a in invalidly than in validly cued trials) suggested, however, that spatial attention was first drawn to the cued position for all types of cue combinations. The subsequent P3b displayed a pattern consistent with the notion that redirecting of attention in invalidly cued trials was impaired when both cues were associated with fear. In conclusion, our results suggest that bimodally presented fear-related cues lead to enhanced focusing of attention making it more difficult to disengage attention from the cued location.

Combining mental rotation and mental folding: Using EEG to understand spatial transformation mechanisms

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Mental spatial transformations have typically been studied using single transformation tasks in isolation, the most common of which are mental rotation and mental folding. In the present work, we introduce a novel task that requires both mental rotation and folding to solve. Specifically, participants were required to mentally transform a target stimulus to match a reference stimulus in order to decide whether two marked points would be aligned or misaligned. In a 3×3 repeated measures design, participants solved trials with different rotation angles (0°,50°,150°) and folding levels (0, 3, 6) whilst 64 channel EEG was recorded. We present behavioural and neurophysiological data which addresses the question as to whether rotation and folding rely on similar or distinct mechanisms, and whether the transformations are applied in a parallel or sequential fashion. Alongside sensor level investigation, we investigated independent time-source series with subsequent equivalent dipole reconstruction to isolate and compare the neural dynamics underlying the mechanisms used in the mental transformation task.

Comparing perceptions of trustworthiness between human and automated agents

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Driven by advances in artificial intelligence, automated systems increasingly automate decision-making. Since trust in decision-makers can affect important organizational outcomes such as organizational citizenship behavior (Singh & Srivastava, 2016) and turnover intentions (Cho & Song, 2017), it is crucial to understand whether the introduction of

automated agents changes trust processes within organizations in comparison to human decision-making. Comparing trust(worthiness) between human and automated agents required us to unravel the different theoretical conceptualizations and definitions of trustworthiness, trust, and reliance in interpersonal relationships (Colquitt, Scott, & LePine, 2007) and in human-computer interaction (J. D. Lee & See, 2004; Madsen & Gregor, 2000). In this talk, we present unpublished findings of a preregistered study that aimed to compare trust(worthiness) perceptions of decision recipients between human and automated agents and to investigate how these perceptions are affected by explanations. Exploratory analyses were conducted to investigate how trust and reliability are affected when former decision recipients become responsible decision makers themselves. A fully randomized 2 (agent: automated vs. human) $\times$ 3 (explanation: equality-explanation vs. equity-explanation vs. no explanation) between-subjects design was used. Participants were recruited from the healthcare sector ($N = 209$) and responded to an online survey. Results showed that although explanations increased understandability other facets of trustworthiness and trust were not affected. Previous experience as a recipient of decisions influenced the reliance when participants themselves were in charge.

Comparing signal detection theoretic models of confidence in perceptual decision making

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What are the computational mechanisms underlying confidence in perceptual decision making? In recent years, researchers have proposed several different extensions of signal detection theory to account for confidence in perceptual decisions and to quantify metacognitive ability in perceptual tasks. However, previous modelling studies of perceptual confidence have often not considered a comprehensive set of alternative computational models. The present study aimed to compare model fits of four recently proposed alternative signal detection theoretic models of confidence, (1) the congruency bias model, (2) the weighted evidence and visibility model, (3) the lognormal noise model, and (4) the confidence boost model. For this purpose, we reanalysed a dataset of an orientation discrimination task with varying contrast, which had previously been considered as support of the lognormal noise model. However, the lognormal noise model was decisively outperformed by each of the three alternative models in terms of model fit, although we were unable to identify which of the three alternative models fitted the data best. In contrast, in a masked orientation discrimination task with varying stimulus-onset-asynchrony as well as in a numerical digit discrimination task with varying contrast, there was very strong evidence that the weighted evidence and visibility provided the best account of the data. These findings suggest that at least two sources of information are required to account for perceptual confidence, one related to the discrimination judgment, and one related to the reliability of perceptual evidence.

Comparing the structure of propensity to trust in human-human and human-technology interaction

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In situations in which one has to rely on another agent the individual's general tendency to trust, i.e., the Propensity to Trust (PPT), has been found to influence behavior of trustors. Therefore, PPT has been recognized by different research areas (e.g., human, machine, or organizational trust) as a fundamental construct to understand human behavior in trust related situations. However, although PPT has been addressed in different lines of research, it must be noted that these streams of research are investigated almost completely separately, which inhibits consolidated theorizing and methodological progress. Indeed, different theoretical concepts of PPT coexist and different domain-specific operationalizations render comparisons even harder. Hence, this talk introduces a literature-based integrative model for measuring PPT along with a respective scale to account for both perspectives of PPT (other humans and technology). Thereby, this talk tries to answer one key question: Is the PTT in humans empirically distinguishable from PPT in machines? Moreover, the dimensionality of PPT, its foundation in basic personality and its predictiveness for behavioral outcomes was investigated. After an extensive review of the PPT literature on trust conceptualizations and operationalizations a theoretical model was developed unifying different approaches. From an initial item pool of 692 items from 32 established trust scales, 94 items were selected, based on theoretical considerations, to form a new PPT scale for both domains. Using structural equation modeling, the dimensionality as well as nomological networks of both PPTs were investigated. Implications of PPT for experimental trust research will be discussed, as well as possible adaptations of the PPT scale to other fields.

Conceptual structure of materials aesthetics – what about expertise?

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Following Fechner (1876), we drew on a bottom-up, exploratory "aesthetics from below" approach to elucidate non-experts' and experts' conceptual structure underlying the aesthetics of different materials (Werkstoffe). This was done for ceramics, glass, leather, metal, paper, plastic, stone, textiles and wood, as well as for the superordinate category materials. Adopting a technique first used by Jacobsen, Buchta, Köhler & Schröger (2004), we asked 2452 non-experts, as well as 401 experts (architects, designers, interior designers) to list adjectives one could use to describe the aesthetics of the materials with two minutes time on task. Descriptive, sensorial qualities constituted the core elements of the non-experts' conceptual structure of the aesthetics of materials, with an outstanding reference to haptic qualities, for example, smooth and cold. Results of an additional valence rating study ascribed the listed terms a rather neutral valence (Marschallek, Wagner & Jacobsen, 2021). Besides a large number of related adjectives, experts additionally

listed aesthetically evaluative terms, for example, modern and elegant. As measured by the ratings in a second supplementary study, a slight majority of the listed terms had a neutral valence, followed by a large proportion of positive terms. The term beautiful, frequently the preeminent term in various domains of aesthetics, was by no means one of the most relevant terms in both studies. The present results show that the conceptual structure of the aesthetics of materials is diversified and rich, and, to some extent, influenced by expertise.

Concerts as an influencing factor of music experiences: Evidence from live and streamed concerts

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While experimental aesthetics has long worked primarily with artificial stimuli in laboratory contexts, researchers have begun to acknowledge the need to study responses to actual artworks in realistic perception contexts. In our group, we take up this challenge by examining music listening in live concerts. We seek to determine which aspects of a concert influence which aspects of the musical experience. In a first exploratory study, we measured aesthetic experience in combination with psychophysiology from 98 participants during three live concerts with an identical programme of string quintets. Different analysis methods were applied to compare the acoustics and the self-reports with the physiological responses during the entire concert. With regard to acoustics, inter-subject correlation was used to identify reliable responses to musical events. It was found that highly correlated responses depicted typical signatures of physiological arousal, but also occurred during important structural moments in the music, namely at transitional passages, boundaries, and phrase repetitions. In a second study, we measured self-reports of aesthetic experience in response to four types of streams of the same musical programme. Stream type had an effect on aspects of general concert experience and on piece-evoked aesthetic emotions. However, these effects were often mediated by stream-type preference, which we had identified via a latent profile analysis. In particular, streams that either included the opportunity for social interaction of audience members or additional information on the programme and the contemporary piece were able to level out negative effects of a group of less interested audience members.

Conflict or intentions: Affective mismatch not social intentions explains reactions to emotions of ingroup and outgroup members

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A frequent observation in intergroup research is that reactions to emotional displays differ as a function of group membership. A confrontation with a happy ingroup member, for example, results in concordant approach reactions, whereas happy outgroup members induce discordant avoidance reactions. There are two explanatory approaches for this

phenomenon: (1) The social intentions account proposes that this response divergence is determined by underlying social messages within the face. (2) The processing conflict account assumes this response pattern to be caused by an affective conflict triggered by incongruent combinations of emotion and the affective connotation of group membership. Our goal was to distinguish between both approaches by separating social intentions from the affective conflict. For this, we created a new paradigm, in which the participant is an outside observer of a social interaction between two displayed persons (i.e., a target and a distractor person). Target and distractor could either share their group membership or not. Participants were required to categorize the emotion displayed by the target, which also could either be ingroup or outgroup in relation to the participant. Thus, with this setup, social intentions critically hinge on the target-distractor group relation, whereas affective conflicts result from the target-participant relation. In multiple experiments, the target-participant relation interacted with the emotion expressed by the target, suggesting that responses are affected by affective conflict. However, the target-distractor relation did not interact with emotion, which indicates no influence of social intentions on participants' reactions. In sum, our data speak in favor of the conflict instead of the social intentions account.

Congruency effects memory on consolidation follow different temporal dynamics across development

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Events that are congruent or incongruent with prior knowledge may benefit memory in different ways. However, little is known about (i) how the memory consolidation of events that are congruent or incongruent with prior knowledge evolves over time and (ii) how the temporal dynamics of this process may differ in children in comparison to adults, due to the ongoing development of the memory systems and accumulation of knowledge. In this study, we examined how short-delay (one night after encoding) and long-delay (two weeks after encoding) memory consolidation of events that are either congruent or incongruent with pre-existing knowledge evolves in 6-7-year-old younger children, 9-10-year-old older children and young adults. Memory was quantified with memory (i) accuracy and (ii) precision for object location. Based on the results so far (70% data collection completed), we found no age group difference in short-delay memory consolidation based on memory accuracy, regardless of congruency. However, younger children showed better short-delay memory consolidation for positioning precision of incongruent items in comparison to other age groups. Long-delay memory consolidation for incongruent items was lower than for congruent items based both on accuracy and precision across all age groups. Specifically for memory accuracy, younger children showed more efficient long-delay memory consolidation for congruent items but worse long-delay memory consolidation for incongruent items in comparison to adults. No such difference was observed between older children and adults. Taken together, the results suggest that memory consolidation of events (in)congruent with prior knowledge follows different temporal dynamics in different age groups regarding memory accuracy and precision.

Connecting working and long-term memory: A Bayesian-hierarchical multinomial modeling analysis of encoding and retrieval processes

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Individual differences in working memory capacity (WMC) are linked to long-term memory (LTM) differences, possibly because high-WMC individuals can encode more strategically or because they can better retrieve information. For the WMC, we gave participants the operation and symmetry span tasks and averaged their z-standardized scores. In the first experiment, we presented participants with a list of 20 consecutive words, including semantically related pairs (e.g., knife – fork), to assess LTM. Participants either received standard instructions or associative-encoding instructions and then completed a free-recall task. In the second experiment, we gave all participants the instructions to memorize the study words as pairs and then they completed a free-then-cued-recall task. For both experiments, we used Bayesian-hierarchical multinomial modeling to estimate encoding and retrieval processes from the recall data for each individual. Significant correlations with WMC emerged only for encoding processes and only when associative encoding was instructed (Experiment 1) or when the words were memorized in association (Experiment 2). WMC was not related to retrieval processes in any condition. This indicates that high-WMC individuals use associative encoding strategies more effectively but it does not support the hypothesis of better retrieval processes (self-cueing) in high-WMC individuals.

Constructing the Facets of Altruistic Behavior (FAB) scale

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Behavior is effectively altruistic to the degree that it is costly for the actor while benefiting others. In a series of preregistered studies, we constructed a 15-item self-report scale assessing three different facets of altruistic behavioral traits: help-giving, moral courage, and peer punishment. Item selection was performed with the help of Ant Colony Optimization (ACO) procedures as implemented in the stuart package for R. Confirmatory factor analysis of the three-factor measurement model showed excellent fit, outperforming classical item selection procedures. The scale was structure-validated in a second sample using a multiple group model that showed full measurement and structural invariance. A pilot study shows correlations of the subscales with economic game decisions. We discuss the scale structure and potential applications.

Context fan in recognition: Insights from metamemory measures

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Context reinstatement effects in recognition are often small and difficult to replicate across experiments. One solution to this problem has been to use metacognitive judgments as measures that can reveal the impact of context on recognition in the absence of an effect on recognition performance. Here we present three experiments that used this metacognitive approach to examine an old issue regarding context reinstatement in recognition: the extent to which this effect is modulated by the number of context-to-item associations. Experiment 1 assessed the role of context fan for old/new recognition, while Experiment 2 employed forced-choice recognition, with both tests accompanied by retrospective confidence judgments. Recognition performance measures proved equivocal across experiments with regard to both context reinstatement and the modulating role of context fan, while the metacognitive measure revealed clear effects of both. Experiment 3 extended these results to spontaneous recognition during restudy as assessed by judgments of learning. Together, the results reveal robust effects of both context reinstatement and the modulating effect of fan, confirming the usefulness of metacognitive measures for revealing memory effects.

Context moderates the effects of auditory cues on anticipation

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Recent work on gaze regulation in object tracking shows that presence of context information (i.e., tracking a hockey puck with full visual information vs. abstract presentation of the puck alone) improves fixation accuracy (Goettker et al., 2021). Such accurate tracking behavior is crucial in successfully predicting an object's trajectory (Land & McLeod, 2000). Indeed, initial findings suggest that context information also improves visual anticipation of shot outcomes in tennis rallies (Murphy et al., 2018). However, to what extent context effects generalize to auditory influences on anticipation (e.g., Cañal-Bruland et al., 2018) remains to be determined. The current study built on a paradigm from Cañal-Bruland et al. (2018), in which experimentally amplified sounds of racket-ball contact in tennis rallies resulted in the prediction of longer ball trajectories. In Exp. 1, participants watched short videoclips of tennis rallies that stopped at the final racket-ball contact. In a first block, they indicated the ball's anticipated landing position via mouse click; in a second block, they rated the ball's speed (order counterbalanced). The sound of racket-ball contact (present, absent) was manipulated within participants. Present sounds yielded longer anticipated trajectories and higher speed ratings. In Exp. 2, the same stimuli were shown without sport specific context by rendering new videoclips that only displayed the moving ball against a blank background. Contrary to Exp. 1, no impact of sound presence on ball anticipation was found. Speed judgments mirrored Exp. 1 (e.g., present = faster). This suggests that context may not only shape the regulation

of gaze behavior, but also impacts the effect of auditory information on anticipation.

Contextualized control – disruption or retrieval?

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Recent literature shows that cognitive control is dependent on contextual information. For example, it has been shown that the congruency sequence effect (CSE), the most widely used behavioral marker for control adaptations, is larger in trial sequences with identical context in prime and probe than in sequences with context changes between prime and probe. Binding accounts suggest that this is due to control states that become bound to the context, and re-encountering that context leads to the retrieval of the bound control state. However, this view is challenged by a disruption account stating that control is proactively maintained until it is disrupted by change in context. We contrasted, these two accounts by adding a disruption trial between prime and probe displayed in a context that is always different to prime and probe (e. g. A-B-A or A-B-C context sequences). The binding account would predict control state retrieval, if prime and probe trial share the same context. However, the disrupt account would predict a continuous control decrease, as the context changes in all successive trials (prime to disruption trial and disruption trial to probe). I will discuss findings from this paradigm with regard to binding and control theories.

Contributions of shape and texture to learning and recognition of same and other-"race" faces

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It has been suggested that texture information contributes more to familiar face recognition than shape and that there is a shift regarding the relative importance from shape to texture with increasing face familiarity. Building on previous research and using stimuli derived from a 3D camera system, we tested contributions of shape or texture information in a learning experiment. Major aims were i) to replicate findings of a dominant role of texture for face recognition and ii) to test whether these findings also extend to other-"race" faces. Note that although the other-"race" effect (ORE; superior recognition of own- relative to other-"race" faces) is well established, the mechanisms underlying it are not well understood. In the present behavioural study, we compared the influence of shape and texture information on Caucasian participants' learning and recognition of Caucasian and East Asian faces using two complementary approaches. In Experiment 1, participants studied veridical, shape-caricatured, or texture-caricatured faces and then were asked to recognize them in an old/new recognition task. In Experiment 2, all study faces were "veridical" (i.e. not caricatured), but we independently removed the diagnosticity of shape (or texture) cues in the test phase by replacing a face's original shape (or

texture) with average face shape (or texture). Despite an expected overall own-"race" advantage, participants' use of shape and texture cues was comparable for own- and other-"race" faces, replicating previous findings that argue for a more dominant role of texture for recognizing learned faces. In addition, the results suggest that the other-"race" effect is not attributable to qualitative differences in the use of shape and texture cues.

Crazy for you! Cognitive processes supporting the decisions for joint action

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We face many tasks that we can solve alone but decide to solve together with others. When do we choose to act together versus alone? Why do we prefer to load the dishwasher by ourselves but ask our partner to prepare dinner together? How long do we persist in working with someone when doing so feels difficult? As humans, we are by far the most skilled and motivated cooperative partners among any other species. Extensive research in comparative, evolutionary and developmental psychology has shown that the survival advantage resulting from engaging in cooperative activities is one of the crucial pressures for the evolutionary selection of a preference for cooperation in humans. Yet, mutual advantage does not wholly explain the reasons for cooperative behavior. Here I will show that humans are strongly motivated to cooperate with others even when it is not necessary to achieve a desired outcome and I will explore the cognitive processes supporting human cooperative decisions in social interactions when they do not provide additional instrumental gain. I will present a series of studies investigating whether human adults prefer to solve cooperative tasks together with a partner rather than alone, and whether their decisions are influenced by the utility of the joint and individual actions they perform. Furthermore, I will present studies investigating whether 14 month old infants, whose ability to engage in cooperation is still limited, expect other agents' to decide for cooperative rather than individual goal achievement.

Creative or not? Bayesian hierarchical diffusion modeling of the evaluation phase of the creative process

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How do we assess whether an idea is creative or not? Most definitions mention two characteristics of creative ideas: they are original as well as useful. Previous findings suggest that people value originality more than utility when they judge creativity. However, individuals may differ in how much they value originality and utility in their creativity judgments. In the extreme, some individuals may take utility into account while others do not at all. To examine conceptions of creativity in a standardized way and to explore individual differences, we used the creative-or-not (CON) task, a timed two-choice decision-making task. In this task, participants decide whether they find uses for certain objects creative or not (e.g., using a book as a buoy). The different use items vary

on the two dimensions 'originality' and 'utility'.We analyzed the CON task data using a Bayesian hierarchical diffusion model. In a sample of university students ($n = 293$; 17,806 trials) we found, as expected, that originality and utility of the use items influence the drift rate of the diffusion model, but that the effect of originality is greater. This finding suggests that people take originality and utility into account when they evaluate creativity, but that originality is considered more important than utility. In addition, we find substantial individual differences in form of a trade-off: The more individuals took originality into account when evaluating creativity, the less they took utility into account and vice versa.

Credit assignment errors as failures of error monitoring in dual-tasking

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In daily life, we constantly perform multiple tasks at the same time which frequently leads to errors. To learn from these errors, an error monitoring system is required that not only detects errors but also traces back internal error signals to the corresponding tasks. If the latter process fails, a credit assignment error can result, that is, the correctly performed task is assumed to have caused an error while the error in the incorrectly performed task goes unnoticed. Here, we investigated whether such credit assignment errors can occur in dual-tasking and whether variables such as temporal proximity of tasks, variable task order and response overlap across tasks affect their frequency. We conducted four experiments with variants of the PRP paradigm in which participants had to report errors for each of the tasks involved. Permutation tests provided evidence that credit assignment errors were more frequent than would be expected based on the frequency of false alarms and misses in each task, and thus, reflect confusions of error signals from the two tasks. Moreover, their frequency was affected by the temporal proximity of tasks but not variable task order, and was increased when both tasks involved overlapping responses. From this we concluded that temporal separation and unequivocal task-response mappings provide cues for successful credit assignment in dual-tasking.

Cross-cultural empirical aesthetics of dance

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Cross-cultural empirical research in all domains of study of human behavior, mind and brain has been programmatically called for in a seminal article by Henrich et al. (2010) [Henrich, J., et al. (2010). The weirdest people in the world? *Behavioral and Brain Sciences*, *33*(2-3): 61-83; discussion 83-135.]. Research in empirical aesthetics has recently started to embrace this call in a systematic manner. In this talk, we present the Persian Dance Movement Library (PDML), along with extensive cross-cultural online validation data from perceptual rating tasks with human observers from two cultures (Iranian, English; $N = 322$). The PDML contains 20 custom-choreographed dance sequences of

six-seconds length (8 counts), danced five times each, with a different emotional intention by the dancer at each repetition; joy, anger, fear, sadness, and a control condition, neutral expressivity (stimuli: $N = 100$). In four separate cross-cultural online rating experiments, Emotion Recognition (ER) rates, along with Expressivity, Beauty and Liking ratings were obtained. While ER rates were relatively low, ratings of Expressivity, Beauty and Liking differed significantly between the emotion categories, suggesting that, perceptually, participants differentiated the emotional intentions of the dancer, even if labelling these according to classical emotion categories was difficult. To investigate the effect of cultural familiarity, a Culture Questionnaire was developed, and its factors as covariates showed that enculturation modulated all perceptual judgments. Results are discussed in the context of research from the domains of general emotion psychology and of cross-cultural empirical aesthetics.

Crowd attention: Improving online teaching by visualizing the variability of student eye movements

Marian Sauter, Teresa Hirzle, Tobias Wagner, Susanne Hummel, Enrico Rukzio, & Anke Huckauf
Ulm University

Giving effective lectures requires constantly managing the attention of an audience. Such crowd attention is typically assessed by observing the viewing direction of audience members. Thus, teachers can easily assess crowd attention in real classrooms, whereas respective gaze cues are largely missing in online teaching. To enable teachers to perceive crowd attention in online lectures, we developed four kinds of visualizations of crowd attention based on hitherto solutions for other interaction paradigms. We collected eye movements of 26 students viewing short lecture videos. Their eye movements were then merged into crowd attention visualizations varying from concrete (i.e., visualization of eye movement variability directly on slides) to abstract (i.e., eye movement variability mapped to a bar plot). In a further quantitative study, 72 instructors evaluated the visualizations. Our disk map emerged as balanced visualization, facilitating teacher-student connection while not being overly distracting. Visualizing crowd attention by disk maps has the potential for broad applications, not only in teaching settings but more generally for online presentations and for their retrospective analysis.

Cue learning via hidden covariation in judgments of learning (JOLs)

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Judgments of learning (JOLs) are people's predictions of remembering recently studied words on a future test. Much research has focused on improving JOL accuracy and mending dissociations between JOLs and actual memory. Nevertheless, how people learn new cue-memory relations and use them for making JOLs is yet to be explored. This study used a hidden covariation detection (HCD) paradigm to investigate cue learning via a

hidden covariation between a new cue and a cue that is predictive of memory performance and known to underlie JOLs. $N = 68$ participants completed three study-test cycles consisting of a study phase with JOLs, a recognition memory test, and a source memory test. In the first two study phases, there was a perfect covariation between concreteness and a new cue (font color or study location). In the third study phase, the covariation was absent. Results showed that JOLs in third study phase were influenced by concreteness but not by the new cue. The two high-threshold model of source monitoring (Bayen et al., 1996) indicated that participants had learned the covariation as became apparent in a biased source guessing in all three cycles. This study shows that learning covariations between cues does not necessarily result in people using new cues for making JOLs. Thus, further research is needed in order to understand cue learning in metamemory.

Cultural diversity in finger counting

Olga Dudojć & Andrea Bender
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Numeral systems differ massively not only across cultures but also across modalities. The last two decades have turned the spotlight on previously underestimated body-based counting practices in contrast to notational and verbal systems (Bender & Beller, 2012; Domahs et al., 2010; Overmann, 2014). Finger counting systems differ with respect to many aspects: structure (e.g., dimensionality, the value of the base/sub-base, dimensional representation of the base), form (starting finger, the transition between hands, the position of hands), function (counting, monitoring), origin (naturally emerged, created), and others. These parameters can entail various cognitive implications for comprehending and processing numbers. For example, the way people count affects processing speed in arithmetical, perceptual, and comparative tasks (Di Luca & Pesenti, 2011). Structural mismatches between notational, verbal, and finger counting habits may impair the acquisition of other number systems and calculations (Beller & Bender, 2011). In my talk, I will present preliminary results from the body-based numeral systems database which is currently being developed within the ERC project "Evolution of Cognitive Tools for Quantification" (QUANTA). I will provide representative examples of finger counting practices and analyze them in view of the aforementioned aspects. Finally, I will discuss the cognitive implications that arise from differences in body-based numeral systems.

Cumulative semantic interference in (simulated) social interaction – an online implementation

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Cumulative semantic interference (CSI) refers to a linear increase of naming latencies for pictures from the same semantic category (Howard et al., 2006). When naming pictures together with a task partner, CSI can also be elicited by the partner's naming (Kuhlen & Abdel Rahman, 2017; Hoedemaker et al., 2017). Stark and colleagues (2021) have replicated the standard CSI effect (i.e. without a task partner) in an online setting relying

on latencies from typed naming responses rather than from overt naming. To investigate further the nature of the partner elicited CSI, we have designed an online experimental setting that evokes a live, virtual social interaction using the open-source library jsPsych (de Leeuw, 2015). Participants are made to believe that they are participating in the study with another task partner. We piloted this setting ($N = 12$) and find that the social interaction was perceived as credible. This setting is not specific to a joint-naming task and can be employed in any online study requiring a virtual social interaction. In our current experiment employing this setting, participants and their supposed task partner will name a series of pictures by typing the corresponding word. The task partner's typing will be simulated by an animation with a latency derived from previous studies to provide a constant reminder of the partner's supposed presence. Five words of each semantic category will be typed by the participant, an additional five words will be typed by either the partner (Joint Naming condition) or nobody (Single Naming condition). In this presentation, we will introduce the virtual social interaction setting and present results of the described experiment. Additionally, we will provide an outlook for future experiments employing this paradigm.

Dealing with highly dynamic models: How behavioral and neuroimaging data can guide the modeling process in applied driving models

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Assisted driving is an area of research that has seen rapid growth in recent years. Next to developments towards full automation, a separate field is making great contributions towards dynamically sharing the responsibilities between machine and human. For a successful implementation of this technology, a key step is to understand the cognitive processes in high workload situations while driving. For example, to reliably predict momentary cognitive workload and task interference. Following this line of research, cognitive models can greatly improve our understanding of the cognitive mechanisms relevant for complex driving scenarios. To this end, we have further developed a cognitive driving model in the cognitive architecture ACT-R. This model simulated behavior and brain data of a dataset in which working memory load and visuospatial demands were manipulated using a modified n-back task and alternating road conditions in a highway driving environment. In this talk, we will highlight the difficulties that arise when specifying and parameterizing highly dynamic models and how we can use data from neuroimaging research as well as behavioral data to guide the model's development. We discuss steps of optimizing this process and show how such driving models when properly calibrated can give insight into cognitive processes and how they can be used to make predictions about behavior and neurophysiology in driving related scenarios.

Decoding non-spatial attention sets in PFC and the functional/anatomical connectivity fingerprints of attention-related control structures in PFC

Daniel Baldauf
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Prefrontal cortex contains two important areas, the frontal eye field (FEF) and the inferior frontal junction (IFJ), that are both involved in the orchestrating functions of attention, working memory and cognitive control. Here we studied both the representational content within PFC (based on MEG-MVPA decoding) as well as its functional and anatomical connectivity patterns (based on temporally high-resolving rsMEG and DTI, respectively). Multivariate pattern analysis in auditory and visual tasks revealed the selectivity of the inferior frontal junction to non-spatial information, e.g., feature- or object-based information, allowing for the successful decoding of non-spatial attention, independently of task modality. In terms of PFC connectivity, we found striking differences in how these regions are connected to other cortical networks: while FEF is more strongly connected with topographically organized areas, IFJ shows systematically stronger connection with sensory areas that lack such a clear topographic organization (predominantly in the ventral visual stream). As both the representational content and the connectivity fingerprints are a crucial pre-requisite for structures in PFC to provide top-down attentional control signals, our data points at a systematic division of labor between FEF and IFj in the control of spatial versus non-spatial attention, respectively.

Desirable difficulty in reading – does letter degradation boost text comprehension?

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Desirable difficulty refers to the assumption that making a task more difficult leads to deeper processing and thus to better memory performance. One form of desirable difficulty is the use of typographically degraded (non-continuous) fonts during reading. A team at the RMIT university in Melbourne developed a degraded font named Sans Forgetica, claiming that it boosts memorization (Earp, 2018). Attempts to test possible benefits of Sans Forgetica on memory performance have so far shown inconsistent results (Eskenazi & Nix, 2021; Taylor et al., 2020). Our work is the first to study the impact of letter degradation both in terms of moment-to-moment word processing and on the level of text comprehension. Participants ($N = 36$) were asked to read five non-fiction texts ($m = 886$ words) while eye movements were recorded. Materials were adapted from Maier and Richter (2013) and displayed alternately in Sans Forgetica and Arial. To assess text comprehension, subjects were presented with 32 statements after each text that had to be rated as true or false. From this, scores were calculated for two levels of text comprehension: the propositional text base and the situation model (Kintsch, 1998). Results indicate a substantial inflation of word viewing times due to the degraded font, especially for longer words and in the first half of the experiment. It is apparent

that readers quickly adapt to the somewhat degraded script. Looking at comprehension, results indicate that Sans Forgetica does not provide any advantage both on the level of text base and situation model. Our preliminary conclusion from these data is that the idea of desirable difficulty as established for other cognitive domains does not apply to normal reading for comprehension. Theoretical implications will be discussed.

Detecting discrete symptoms of neglect with the immersive virtual road crossing task (iVRoad)

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Unilateral spatial neglect is a disabling neurocognitive disorder characterized by a lack of attention to stimuli in the contralesional, often left hemispace (Heilman et al., 2000). Conventional pencil-and-paper tests, such as cancellation or line bisection tasks, unreliably and insufficiently assess discrete symptoms of neglect, which can impair activities of daily living. To sensitively detect and quantify subtle neglect symptoms, we developed iVRoad: In this intersection scenario of two parallel, two-lane, heavily trafficked roads, participants are to cross the virtual street, drop a letter into a mailbox on the left or right side and return. We tested iVRoad using the HTC Vive Pro Eye in 60 subjects (right hemisphere stroke with left neglect ($N = 20$), without neglect ($N = 20$) and matched healthy controls ($N = 20$)). Performance (e.g., reaction time, errors) and movement parameters (e.g., head rotation, eye movement) were analyzed to identify group-specific behavioral patterns. Given the lateral orientation in neglect, we compared performance between groups with respect to alternating traffic directions (i.e., cars coming from the left, right, or both sides). Overall, the task was well-tolerated by all participants. The following parameters were most suitable to distinguish neglect from no-neglect and control subjects: reaction time ($F(2, 50) = 16.04$, $p < .001$, $\eta_p^2 = 0.25$), left-sided errors ($F(2, 50) = 12.34$, $p < .001$, $\eta_p^2 = 0.33$), and lateral head movements for cars approaching from the left side ($F(2, 50) = 12.73$, $p < .001$, $\eta_p^2 = 0.34$). IVRoad is an immersive, naturalistic task, which can measure clinically relevant behavioral variance and detect discrete neglect symptoms.

Detecting greenwashing! The influence of color and price on consumers' detection accuracy of faked bio-fashion

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University of Kassel

We investigated visual executional greenwashing influences on actual deception detection behavior. Based on category inferences mechanisms assumptions, we hypothesized: The more the visual product cues color and price fit to the mental representation of the corresponding category-prototype, the higher the probability of classification into the category and to getting deceived. Results of two studies confirmed our assumptions. Female par-

ticipants classified on screen presented fashion products with actual bio and actual not bio status in bio-typical and not bio-typical colors (with high and low prices) as bio or not bio. We found out that a bio-typical color and a high price are enhancing classification as bio and so a deception by executional greenwashing. This effect was shown independent from consumers' (self-rated) motivation to detect deception, classification confidence, and varying ecological context experience.

Development of a textile-integrated sensor system to assist the rehabilitation after cruciate ligament injuries: Comparison of user experience and usability evaluation of initial prototypes

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The yearly incidence of cruciate ligament ruptures in Germany is estimated to be 45 per 100,000 residents. Even after successful surgical treatment, a great number of patients experience instability in the injured knee (giving-way phenomenon), resulting in avoidance behavior, uncertainty regarding the own physical resilience, and functional limitations in everyday situations. To address this problem, an innovative system for reducing critical movements and subsequently improving the rehabilitation after cruciate ligament injuries is being developed. Motion sensors are integrated in a smart knee bandage to detect critical movements such as giving-way events. Via vibratory feedback the patient will be notified and enabled to adjust the knee position accordingly. The present study aims at comparing usability and user experience aspects of three initial prototypes (P) of the described knee bandage. The prototypes mainly differ in how the sensor and battery elements are fixated. P1 ($n = 6$) and P2 ($n = 5$) have no sensor casings, one big battery case, and all elements attached directly to the textile. In contrast to P1, P2 has sticked electric lines. P3 ($n = 5$) has sticked electric lines, sensor casings, and two smaller battery cases. Furthermore, the sensor elements are fixed on a separate mesh substrate which is added after the patient put on the textile base. A one-way ANOVA revealed no significant difference between the three prototypes regarding haptics, usefulness, originality, and wearability of the knee bandage. This is most likely due to a ceiling effect since all prototypes were evaluated strikingly positively. The content of the free text inputs by the testers will be evaluated to gain insights for the further development.

Differences in trust processes between human and automated trustees in light of unfair bias

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Automated systems increasingly support decisions where ethical considerations are central to trust development in human-system collaboration. However, insights regarding trust in automated systems predominantly stem from contexts where the main driver of trust is that systems produce accurate outputs (e.g., in alarm systems). It remains unclear whether what we know about trust in automated systems translates to application

scenarios where ethical considerations (e.g., fairness) play a crucial role in trust development. In a personnel selection context, we investigate trust processes in light of a trust violation relating to unfair bias and a trust repair intervention. Specifically, participants evaluated applicant preselection outcomes by either a human or an automated system across twelve personnel selection tasks. We additionally varied information regarding imperfection of the human and automated system. In task rounds five through eight, the preselected applicants were predominantly male, thus constituting a trust violation due to potential unfair bias. Before task round nine, participants received a trust repair intervention. Results showed that participants initially perceived automated systems to be less trustworthy. Furthermore, the trust violation and the trust repair intervention had weaker effects for the system. Those effects were partly stronger when highlighting system imperfection. We conclude that insights from classical areas of automation only partially translate to the emerging application contexts of such systems where ethical considerations are central to trust processes.

Differential effects on serial recall of verbal and spatial items in children and adults due to irrelevant speech

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Task-irrelevant speech, which the participants are instructed to ignore, interferes with immediate serial recall of visually presented items. The so-called Irrelevant Speech Effect (ISE) has been linked to attentional capture, phonological interference, and interference with serial order representations of both verbal and visuospatial items. We investigated the effects of background speech on serial order reconstruction of verbal and spatial items in third-grade children and adults in order to learn more about the roles of phonological processing, serial order retention, and attention control in the ISE. In the verbal task, the children (adults) were shown picture sequences of 5 (8) German nouns (e.g., frog, bed, moon). In the spatial task, sequences of 5 (7) dots were presented at different screen locations to the children (adults). In the recall phase of both tasks, all items were displayed on the screen at the same time, and participants had to mouse-click on the items in the right serial order. In both age groups, we found significant performance decrements due to irrelevant speech in the verbal task. Children were more impaired than adults. Irrelevant speech had no effect on the spatial task performance of either children or adults. These findings suggest that phonological processing is a precondition for ISE evocation.

Disentangling individuals' aesthetic preferences for order and complexity: A parametric, multidimensional approach

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KU Leuven

Which visual displays do we aesthetically appreciate, and why? Order and complexity

have often been suggested as important factors related to appreciation, but the exact type and direction of their relation to appreciation is still under debate. To disentangle individuals' aesthetic preferences for order and complexity, it is important (a) to manipulate order and complexity independently and in a parametrically controlled fashion; (b) to study the relation of both factors to appreciation in combination rather than separately; and (c) to acknowledge the multidimensional nature of order and complexity. In a first study, we used the recently developed OCTA toolbox to investigate whether individuals' preferred complexity levels for color, shape, and size depend on the level of order present in the display. In a 2AFC task, participants ($N = 415$) indicated their preferences for a series of image pairs, in which complexity levels were varied within each pair, and order levels between pairs. Also, individual differences in preferences for color, shape, and size complexity were explored. Results indicated that (a) not all complexity types are appreciated similarly, (b) not all individuals appreciate complexity equally, and (c) complexity is more often preferred in highly ordered stimuli than in stimuli with a lower order level. A second study examined ratings of order, complexity, pleasantness, and interest for a parametrically controlled set of 1,611 stimuli varying systematically in multiple order and complexity dimensions. Results confirmed the differential relation of different types of appreciation to order and complexity, and provide insight in the extent to which some objective order and complexity manipulations influence perceived order and complexity.

Disentangling the impact of attribute and option attention on risky choice

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Probability weighting—the notion that risky outcomes are weighted as a function of their probabilities—is one of the most powerful theoretical ideas in descriptive models of risky choice and forms a central component of cumulative prospect theory (CPT; Tversky & Kahneman 1992). Recent empirical analyses suggest that probability weighting may be rooted in attentional processes: one analysis observed that differences in the shape of CPT's probability weighting function are associated with differences in how attention is allocated across attributes (i.e., probabilities vs. outcomes; attribute attention); another analysis observed a link between probability weighting and differences in how attention is allocated across options (option attention). These findings are perplexing, as they suggest that probability weighting functions with one and the same shape could be driven by very different attentional policies. Here we disentangle the links of probability weighting with attribute attention and option attention and investigate their relationship: Do they result from the two facets of attention allocation being empirically confounded; or do they represent distinct phenomena? Reanalyzing data from a process-tracing study with Mouselab, we find that biases in attribute and option attention are only weakly related to each other. More importantly, attribute and option attention have distinct and independent effects on probability weighting. The analyses contribute to a better understanding how of information attention shapes decisions under risk; they also underscore the limits of the explanatory value of CPT's probability weighting function. We discuss the implications of our findings for the development of cognitive process models

of risky choice.

Diurnal rhythm of the temporal reproduction as a function of stimulus eccentricity in the visual field

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The aim of this study was to elucidate how temporal reproduction changed in a diurnal time course. For this purpose, a 16h/8h wake-sleep protocol was administrated. We examined 18 female young subjects in an isolated 16-hour constant lighting (1000lux) room. Two standard durations (1500ms and 4500ms) randomly presenting at two stimulus eccentricities (7° and 21°) were asked to be reproduced during the waking time with 2-hour bins (7:00, 9:00, 11:00, 13:00, 15:00, 17:00, 19:00, 21:00, 23:00, 7:00 in the next day). Only the left visual field and left eye were stimulated. The results showed significant clock and duration main effects, but no eccentricity effect. The reproduction of 1500ms was on average overestimated and of 4500ms was underestimated, as anticipated by the Vierordt effect. The overestimated reproduction showed a smaller difference to the standard in the morning and evening and a larger difference in the afternoon, and the underestimated reproduction showed an inverse change. No eccentricity effect in temporal production was observed, which indicates homogenous temporal processing shared in the perifoveal and peripheral visual fields. The results suggest that a two-process model is underlying temporal reproduction in the diurnal rhythm for within and beyond the time window of 2 to 3 seconds.

Do internalized social norms and expertise influence how subpopulations appreciate tattoo aesthetics? The conceptual structure of tattoo aesthetics

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Body modifications find more and more acceptance and popularity. Therefore, the question arose, how different subpopulations appreciate tattoos in terms of aesthetics. The goal of this study was to investigate the conceptual structure of tattoo aesthetics, with a particular focus on the effects of internalized social norms and expertise. Three groups ($\leq$ 49 years, $\geq$ 50 years, and experts) of 497 participants were instructed in a timed free-listing task to write down adjectives that could define tattoo aesthetics. Applying several statistical analyses including a generalized Procrustes analysis, we highlighted the variance and complexity with which individuals verbally expressed their perceived aesthetic appeal of tattoos. Interestingly, for two of the three groups, the results did not reflect a coherent concept of beauty, nor did they present a clear bipolar dimension of beautiful/ugly. Nonetheless, the concept of beauty was found prevalent in tattoo aesthetics, as well as the identification of aesthetic and descriptive–evaluative dimensions, with terms such as beautiful, ugly, multicolored, and interesting being the most notable adjectives, although not with the highest valence. Based on the intricacy of the phenomenon,

the study discovered a high overall diversity of terms that elicit cognitive and affective components as well as uncovered results influenced by person–situation interactions in a field-theoretic sense.

Do people choose to be efficient or fair when allocating tasks in a joint action?

James Strachan
Italian Institute of Technology

Individuals have a drive towards maximising the efficiency of their actions – given a choice of two actions to achieve the same goal, they will choose the action that incurs the fewest costs. When performing joint actions, on the other hand, people prioritise the joint or co-efficiency of the overall action even when this comes at a cost to themselves, suggesting that participants distribute joint actions according to a rational decision-making strategy that prioritises the efficiency of the dyad over either individual. However, it remains an open question whether participants in a joint action are willing to sacrifice their partner's individual efficiency for the greater good, when forcing a partner to incur additional costs may be interpreted as unfair. We investigate whether the reputational motivation to be seen as fair would interfere with the tendency to maximise co-efficiency. In two experiments, we explored how participants chose to distribute a motor task that required either a fair or unfair distribution of labour. Whether there was opportunity for reciprocity (Experiment 1) or not (Experiment 2), participants systematically maximised the coefficiency of their joint actions regardless of how unfair this distribution proved to be regarding individual action costs. Our results suggest that people allocate tasks within a joint action using a decision-making strategy that prioritises overall efficiency over both individual efficiency and considerations of fairness.

Do powerful situations overwhelm the potential to show moral courage? The function of personality and emotions in weak and strong situations

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The present research investigates the relationship between situational and trait anger, justice sensitivity (i.e., observer sensitivity), environmental factors (i.e., norm violation, risk perceptions), and prosocial responses of bystanders in situations of norm violation. Three studies using a multi-methods approach investigated whether these determinants of moral courage consistently predict (1) intention to intervene and (2) overt behavior in situations that differ in adversity. Across three studies ($N_{\text{all}} = 339$), we predicted that situational anger is associated with intervention intention, especially when participants were likely to experience anger in general (state-trait anger interaction). The results indicate that situational anger was associated with intervention intention across all three studies, whereas its interaction with trait anger was associated only with offensive (e.g., attacking the perpetrator) compared with defensive (e.g., call the police) interventions

strategies. Moreover, we predicted and found an association of observer sensitivity with intervention intention and actual behavior. The association of observer sensitivity and intervention intention, however, varied depending on the situation's severity and showed only in weak but not strong situations. It vanished altogether when the bystander's perceived intervention risk reached a threshold. The results critically reflect the predictions from state-trait models and discuss the predictive power of personality traits in weak versus strong situations that require helping by the bystander. The present research helps to define the boundary conditions for morally courageous behavior.

Do we know what's in and what's out? The mental representation behind inward and outward articulation dynamics

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People prefer linguistic stimuli with an inward (e.g., BODIKA) over those with an outward articulation dynamic (e.g., KODIBA), a phenomenon referred to as articulatory in-out effect. Despite its robustness across languages and contexts, the cognitive processes behind this effect are still at debate – up to the discussion whether the effect is about inward and outward articulation dynamics at all. In the present research, we examine whether people have a mental representation of inward and outward articulation dynamics. In three experiments ($N = 420$, two experiments preregistered) with an evaluative conditioning procedure, we systematically paired words with inward versus outward dynamics with positive versus negative valence. Although this evaluative conditioning procedure attenuated or even reversed the in-out effect, this moderation only occurred for words with the same consonant sequences as the conditioned words. For words with inward/outward dynamics but different consonant sequences than the conditioned ones, no moderation of the in-out effect was found. These findings imply that people do not have a generalized mental representation of inward/outward dynamics but instead evaluate stimuli based on stimulus-specific properties.

Does (in)congruency between text sequence and retrieval format matter? Effects on retrieval success and long-term learning

Roman Abel & Julian Roelle
Ruhr University Bochum

To promote long-term learning from expository texts, it is necessary to stimulate inferential and consolidation processes. Recent studies indicate that providing learners with interleaved texts (i.e., re-structured texts for highlighting the contrast between the to-be-learned categories) stimulates spontaneous inferential processing to a higher extent than providing learners with blocked texts (i.e., conventionally structured texts by present-

ing one category at time). In the present research, we investigated the question how to design the retrieval practice (with regard to the sequence of the to-be-retrieved information units) to optimally promote the consolidation processes after reading an interleaved (vs. blocked) text. We conducted two between-subjects experiments. In Experiment 1, learners read a blocked text about whales and retrieved the contents in a blocked format (i.e., all characteristics per whale) vs. in an interleaved format (i.e., all whales per characteristic) vs. reread the text. In Experiment 2, we employed a 2×2 design by manipulating the text structure (blocked vs. interleaved) and retrieval format (blocked vs. interleaved). Across both experiments, learners read the expository text, retrieved the contents, reread the text and retrieved the contents for the second time. We assessed the long-term learning after one week-delay. We expect the congruency between the text structure and retrieval format to support the retrieval success. However, we expect the in-congruency to benefit the long-term learning because the in-congruency engages learners in effortful reconstruction processes a) during the retrieval phase – as direct testing effect and b) especially during the subsequent re-reading phase – as forward testing effect.

Does self-evaluation impact neural and behavioural correlates of error processing? Investigations from a novel complex choice task

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University of Cologne

Error processing is essential to adapt our actions and reach our goals in everyday life. The way we process errors can vary with error awareness and the significance we subscribe to them. In error detection tasks, we assess error awareness by having the participants evaluate their response accuracy immediately after response execution. In our study we measured the electroencephalogram and used cognitive neuroscience methods to establish if this immediate self-evaluation itself influences error processing in a novel complex choice task. Self-evaluation might intensify error processing by enhancing error significance or weaken it by taking up attentional resources. In the first part of the experiment, participants performed our novel speeded choice task with a complex stimulus-response assignment. In the second part, they additionally evaluated their response accuracy after every trial. We replicated common variations of early and later stages of error processing and action adaptation with error detection. We found evidence that self-evaluation enhanced error evidence accumulation in our complex task, while early error monitoring remained unaffected. Multivariate pattern analysis revealed a substantial influence of self-evaluation on brain activity patterns preceding and following the response onset, independent of response accuracy. The classifier was able to differ between responses from the self-evaluation and the no-self-evaluation condition as early as several hundred milliseconds before response onset. Further analyses point to a combination of self-evaluation and time on task that causes these effects, indicating that next to its influence on error processing, self-evaluation also impacts more general processes such as attentional resources and stimulus encoding.

Does temporal preparation influence bottom-up salience in spatial selection? Evidence from the N2pc

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University of Tübingen

Previous research has established that temporal preparation facilitates spatial selection in visual search. In two ERP studies, we aimed to clarify how specifically temporal preparation influences spatial selection. According to visual search models, spatial selection of stimuli is affected by bottom-up salience, top-down goals, and selection history. We investigated whether temporal preparation influences bottom-up salience. To this end, we employed a visual search task in which participants ($N = 24$ in both studies) searched for a salient target among homogenous distractors, and we measured the N2pc as an index of spatial selection. To manipulate bottom-up salience, we either presented a salient but task-irrelevant distractor (Study 1), or we varied the salience of the target (Study 2). To manipulate temporal preparation, we presented a warning signal before the search display and varied the interval between warning signal and search display (blocked foreperiod paradigm). In both studies, temporal preparation accelerated spatial selection of the target, as indexed by a reduction in the onset latency of the target N2pc. In Study 1, temporal preparation additionally modulated the amplitude of the N2pc elicited by the salient but task-irrelevant distractor. Furthermore, in Study 2, temporal preparation reduced the latency of the target N2pc to a stronger extent for low salient targets than for highly salient targets. Together, the results of the two studies provide evidence that temporal preparation facilitates spatial selection by influencing bottom-up salience.

D-Psy-FAIR: A curation standard enabling a sustainable and high-quality documentation of psychological research data

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As one of the major foundations of Open Science, data sharing is becoming a crucial element of scientific progress in psychology. The goal is to enable and increase the sustainable (re)use of psychological research data. This, in turn, requires high-quality data management and documentation. In order to provide researchers with an easy-to-use way to create high-quality and, in this regard, sustainable documentation of their research data, we have started to empirically develop a discipline-specific curation standard. Specifically, we began by investigating existing standards and their potential for the curation of psychological research data, as well as by exploring the nature of necessary information and as to how existing standards meet those requirements. Proceeding from those results, we defined a content specification for the curation standard D-Psy-FAIR allowing for the method-specific documentation of the entire research process. In order to test the standard´s specification as well as its usability, three user studies were conducted with samples composed of psychological researchers. The first two user studies revealed valuable insights about the information processing that takes place when reusing data, as well as about the required information content and presentation form for optimal data

reuse. In the third user study, we then tested whether the documentation standard could increase the reuse potential of psychological research data. In this talk, we would like to present and discuss the preliminary results of these studies, especially with regards to the standard´s potential value fostering the cultural change in psychology.

Dutch and Turkish children differ in their acquisition of space-pitch associations

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Languages vary considerably in how they describe sensory experiences. For instance, some languages express auditory pitch in terms of spatial height (high vs. low), while others use thickness terminology (thick = low frequency vs. thin = high frequency). To what extent do these cross-linguistic differences affect the way children learn space-pitch vocabulary and how do children associate spatial dimensions and pitch when no language is used? We addressed these questions by examining the developmental trajectory of linguistic and non-linguistic space-pitch associations in children who acquire Dutch (a 'height-pitch language') vs. Turkish (a 'thickness-pitch language'). Five-year-olds, 7-year-olds, 9-year-olds, and 11-year-olds were tested in how well they understood height-pitch and thickness-pitch terminology as well as in their nonlinguistic height-pitch and thickness-pitch associations. Overall, we found better performance for thickness-pitch than for height-pitch associations across tasks. This was true for Turkish children but also for Dutch children who are not exposed to thickness-pitch terminology in their input language. Consequently, associations between spatial thickness and pitch do not seem to originate in linguistic pitch terminology and appear more intuitive than height-pitch associations. By contrast, Dutch speaking children did not show reliable height-pitch associations and full comprehension of height-pitch terminology until age 11. Turkish speaking children even reversed height-pitch associations. The acquisition of height-pitch mappings thus appears less stable than thickness-pitch associations. Whereas thickness-pitch associations are acquired in similar ways, the acquisition of height-pitch terminology differs more substantially across cultures.

Effect of anodal tDCS over the left dorsolateral prefrontal cortex on task shielding in dual tasking

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Performing two tasks at the same time often results in processing interactions (crosstalk) between both tasks. The backward crosstalk effect (BCE) is observed when Task 2 processing influences Task 1 performance. The BCE arises due to dimensional overlap between the features of both tasks. In such cases, Task 1 needs to be shielded from Task 2 processing. The size of the BCE is an indicator of how well Task 1 processing is protected from the automatic Task 2 processing. Thereby, effective shielding of the

prioritized Task 1 is associated with smaller BCEs. Many studies have shown that the left dorsolateral prefrontal cortex (dlPFC) plays a crucial role in various multitasking performances. Therefore, in the present study, we applied anodal transcranial direct current stimulation (atDCS [1 mA, 20 minutes]) vs. sham stimulation [1 mA, 30 seconds] over the left dlPFC in healthy young adults ($N = 34$) while they performed a dual-task experiment. The dual task consisted of a visual Stimulus 1 followed by an auditory Stimulus 2 (40, 130, and 300ms SOA). Participants revealed more errors and increased Task 1 response times in incompatible trials as compared to compatible trials, indicating a BCE. Further, a smaller BCE, specifically in errors, was observed under atDCS as compared to sham stimulation at the shortest SOA. These results suggest that atDCS over left dlPFC facilitates the shielding of prioritized task processing from influences of simultaneous task processing.

Effects of 18 hours fasting on task choice and performance in voluntary task switching paradigm with food stimuli

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Martin-Luther-University Halle-Wittenberg

Previous research has demonstrated that affective stimuli gain enhanced access to attentional resources and that this causes switch cost differences when participants switch between affective and non-affective task-sets in cued task-switching. The aim of the present study was to investigate, how 18h food deprivation (i.e. fasting) and habitual restrained eating influenced the freely determined task choice and performance in voluntary task switching paradigm with neutral digit and affective food stimuli. Fasted ($n = 28$) and sated ($n = 29$) participants categorized digits from 1 to 9 (except 5) as odd or even and food pictures as sweet or savoury. Participants were instructed to freely decide which task to perform in each trial, but both tasks had to be performed equally often. Restrained eating was operationalized through German version of the Three-Factor-Eating-Questionnaire. Results showed lower switch cost when switching to the food task (134ms) compared to switching to the neutral digit task, (246ms, $p < .001$) in both groups. Switch cost when switching to the neutral digit task was significantly higher in fasting group (283ms) compared to the sated group (209ms; $p < .05$). Restrained eating was not related to any of the switch costs. There was also no effect of fasting and restrained eating on task choice and on switch rate. Our results indicate that the emotional content of the stimulus situation of a task-set leads to faster activation of this task-set in working memory, which results in smaller switch cost. The observation of larger switch cost for the neutral task fits the assumption that due to higher activation of the affective task-set, more effort is needed to overcome the task-set of the food task in order to activate the task-set of the neutral digit task.

Effects of a neuromodulation method on effort-related cardiovascular measures

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I will present an integrative hypothesis that aims to link neuromodulation research with effort research. Research on transcranial direct current stimulation (tDCS) has shown that anodal stimulation of the dorsolateral prefrontal cortex (DLPFC) improves objective ability in working-memory tasks. Furthermore, work on effort has shown that ability has a strong influence on effort: the lower the ability, the higher the effort. On this basis, I will present an experiment that tested the idea that tDCS - through its influence on objective ability - should alter effort during a mental concentration task. In this study, participants were administered tDCS before completing an extremely difficult working-memory task, during which effort-related cardiovascular responses were measured. Results showed that the stimulation condition resulted in higher effort compared to two control conditions where effort was very low. This is consistent with the notion that tDCS stimulation allows participants to stick with a difficult task due to its effect on objective abilities: Higher abilities decrease the perception of task demand, and this leads to a high but still feasible task demand. In contrast, very low effort in the control conditions corresponds to the idea that participants would disengage without stimulation because the task would be too demanding. To our knowledge, the present work is the first to show an effect of tDCS on effort-related cardiovascular measures.

Effects of background speech on subsequent behaviour

Jan Philipp Röer
Witten/Herdecke University

In this talk, I will give a brief overview of three experiments that investigated the effects of background speech on subsequent behaviour. The procedure was the same in all experiments. Participants performed a serial recall task, either in silence or while task-irrelevant background speech was presented over headphones. Subsequently, participants undertook what they believed to be an unrelated norming study, in which they were asked to write down exemplars from different semantic categories (Experiment 1), solve CRAT problems (Experiment 2), and rate how confident they were that a statement was true or false (Experiment 3). In all three experiments, a clear effect of background speech on subsequent behaviour was observed. Previously presented words were more likely to be written down as category exemplars (Experiment 1), they were more likely to be used as solution words for CRAT problems (Experiment 2), and subjective truth ratings were higher for previously presented statements compared with new statements (Experiment 3). Theoretical implications and avenues for future research are discussed.

Effects of color, route-instructions and birdseye's map in human wayfinding

Manish Kumar Asthana
Indian Institute of Technology

Human beings are living in a dynamic and complex environment. They are often exposed to extensive wayfinding information, which might result in ineffective and poor decision-making. This study examines the impact of color, route instruction, and Birdseye's map in human Wayfinding. An experiment designed with four different conditions as follows: (i) Instruction-Bird's eye (IBV condition), (ii) Instruction-No-Bird's eye (INBV condition), (iii) No-Instruction-Bird's eye (NIBV condition), and (iv) No-Instruction-No-Bird's eye (NINBV condition). Participants' task was to find their way to a goal in a virtual environment with either a colored or grey ground. Fifty-four healthy college students ($18-35$ years) took part in the study. All participants were requested to complete informed consent and a set of screening questions, and a demographic form. Participants were given a training section (exploration phase) to explore and learn about the environment and system. The experiment was divided into two halves, with a 5-minute break to reduce the trial learning effect. In the first section, individuals were randomly assigned to one of four colored or grey randomized trials. Participants finish the second half of the experiment after taking an activity break. It was found that color has a significant effect on landmark identification and wayfinding performances in external environments. The results revealed that both route instructions and Birdseye's map helped individuals in Wayfinding. Specifically, trials 1, 2, and 4 showed a significant effect of color, leaving the grey condition non-significant. In general, individuals' landmark identification and wayfinding performance seem to have benefitted from color, route instruction, and Birdseye's map in the virtual environment.

Effects of irrelevant speech and word length on immediate serial recall: What role of rehearsal?

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Visual-verbal serial recall is reliably impaired by task-irrelevant background speech that the participants are instructed to ignore ("irrelevant speech effect", ISE). The wordlength effect (WLE) is the serial recall advantage for short when compared to long words. The ISE has been attributed to specific interference of obligatory sound processing with either the integrity of phonological traces in a phonological short-term store (phonological loop account), or the efficiency of the rehearsal process employed for serial order retention (changing-state account). Both the phonological loop and the changing-state account assume that the WLE reflects articulatory rehearsal of the list items, and that the ISE and the WLE exert independent, additive effects on serial recall performance. However, the role of rehearsal in the ISE and WLE has been questioned by studies showing that the effects survive when rehearsal is blocked through rapid presentation of the list items. In a series of current experiments, we investigate the combined effects of irrelevant speech and

word length on serial order reconstruction of German nouns presented pictorially, using standard and rapid presentation rates. Serial order reconstruction was used instead of serial recall in order to rule out an impact of recall time, and thereby output interference, in the word length effect. With a standard presentation rate, we found reliable and independent effects of wordlength and irrelevant speech. These results will be compared to those from current experiments with a rapid presentation rate. Implications for dominant accounts of the ISE and WLE are discussed.

Effects of non-driving related tasks performed during SAE Level 3 automated driving phases on subsequent takeover and manual driving behavior

Elisabeth Shi
Federal Highway Research Institute

Advancing to SAE Level 3 driving automation, the driver is released from the driving task when the system is active. Yet, system limits are inherent to Level 3 which means that at some point in time the user needs to re-engage in the driving task, at the latest upon request by the system. To explain and predict effects of non-driving related activities on subsequent takeover and driving behavior, empirical studies draw on dual-task theories (e.g. Wickens, 2008) that have been successfully used for earlier driving settings in which driving task and non-driving related tasks had to be performed concurrently due to lack of driving automation. SAE Level 3 driving automation, however, allows sequential performance of non-driving related activities. Hence, to account for this new characteristic of the driving setting, the study at hand applies task and modality switching theories from basic psychological research to the Level 3 driving automation setting. Three non-driving related tasks were chosen based on the task switching model by Rubinstein, Meyer and Evans (2001). Effects of non-driving related tasks on both takeover behavior and manual driving behavior following a system-initiated takeover procedure were investigated. To allow for high external validity, the study took place in a real-driving setting using a Wizard-of-Oz vehicle on a test track. Results indicate that non-driving related tasks with greater differences to the subsequent driving task regarding mental demands are followed by slower takeover and more critical avoidance of a suddenly appearing obstacle in the manual driving phase after completed takeover from Level 3. Finally, implications for required time for takeover and suitability of non-driving related activities in Level 3 driving automation are discussed.

Effects of spatial influences on inhibition of return in online studies

Paula Soballa, Lars-Michael Schöpper, Christian Frings, & Simon Merz
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Inhibition of return (IOR) refers to the phenomenon that reaction times are slower to a target when it is presented at the same location a cue was shown shortly before, compared to conditions with previously uncued locations. This response delay is often preceded by

a short period of the reversed effect, the facilitation of return (FOR), where a location repetition between cue and target leads to faster responses. IOR has been investigated for nearly 40 years with a lot of different stimuli, in variants of the standard design, and across modalities. Yet, it is still unclear, whether spatial biases influences IOR as stated by Spalek and Hammad (2004) or if the observed differences are better explained through general reaction time differences depending on the target position (Snyder & Schmidt, 2014). Further, neither IOR nor FOR have been systematically investigated online yet. With the aim to clarify both questions, three online studies (each $N = 31$) were conducted and different time intervals and target locations were systematically examined. IOR was reliably observed with cue durations of 50 and 300ms as well as different interstimulus intervals ranging from 0 - 900ms. Furthermore with shorter stimulus onset asynchronies, FOR was observed. Essentially, IOR effects were moderated by target locations and the main effect of target position even revealed a lack of IOR at the lower location in all three experiments. Crucially, those results cannot be explained as a function of general reaction time differences and target position.

Effects of speed-accuracy tradeoffs in decision-making under conflict

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The cognitive processes underlying the ability of human performers to trade speed for accuracy is often conceptualized within evidence accumulation models, but it is not yet clear whether and how these models can account for decision-making in the presence of various sources of conflicting information. In the present study, we provide evidence that speed-accuracy tradeoffs (SATs) can have opposing effects on performance across two different conflict tasks. Specifically, in a single preregistered experiment, the mean RT congruency effect in the Simon task increased, whereas the mean RT congruency effect in the Eriksen task decreased, when the focus was put on response speed versus accuracy. Critically, distributional RT analyses revealed distinct delta plot patterns across tasks, thus indicating that the unfolding of distractor-based response activation in time is sufficient to explain the opposing pattern of congruency effects. In addition, a recent evidence accumulation model with the notion of time-varying conflicting information was successfully fitted to the experimental data. These fits revealed task-specific time-courses of distractor-based activation and suggested that time pressure substantially decreases decision boundaries in addition to reducing the duration of non-decision processes and the rate of evidence accumulation. Overall, the present results suggest that time pressure can have multiple effects in decision-making under conflict, but that strategic adjustments of decision boundaries in conjunction with different time-courses of distractor-based activation can produce counteracting effects on task performance with different types of distracting sources of information.

Effects of verbal negation on TVA's capacity and weight parameters

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How does verbal negation influence attention? Although rarely asked in research, it stands to reason that instructions using a negation might hamper the distribution of attention. The present work investigates the influence of verbal negation on attention by combining the theoretical concepts of pragmatic frames and TVA. The concept of pragmatic frames allows formalizing the interaction between two partners intending to attain a joint goal. According to Rohlfing et al. (2016, Frontiers in Psychology), pragmatic frames can be defined as sequences of collaborative actions performed with a partner, involving operations on the cognitive as well as communicative and pragmatic level. Interaction history is a key aspect in pragmatic frames. Repeating a particular situation leads to familiarization and enables partners to develop expectations regarding how actions relate to each other. The present work examines the cognitive aspect of interaction history. Attentional parameters were assessed via unspeeded temporal-order judgement tasks. Study results indicate that—depending on the setting—the overall available processing capacity can be affected by negation. We will discuss repetition effects on visual capacity between the negation and affirmative condition and relate our findings with other studies assessing TVA parameters in dual-task situations.

Effekte von externalen Mensch-Maschine-Schnittstellen hochautomatisierter Fahrzeuge in Szenarien mit mehreren Fußgängern

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Hochautomatisierte Fahrzeuge (AV) und ihre Integration in einen zukünftigen Mischverkehr stehen immer mehr im Fokus von Automobilherstellern und Forschung. Da die Anwesenheit menschlicher Fahrer im AV nicht mehr Voraussetzung ist, wird eine sichere und unmissverständliche Interaktion des AV mit der Umwelt essentiell sein. Externale Mensch-Maschine-Schnittstellen (eHMI) wurden hierbei als Lösungsansatz untersucht. Aktuelle Forschung hat sich dabei bisher v.a. auf einfache 1-zu-1-Interaktionen fokussiert und komplexere Szenarien mit multiplen Interagierenden vernachlässigt. Ziel der vorliegenden Studie war es somit, zu untersuchen, wie existierende eHMI-Kommunikationsdesigns in komplexeren Szenarien interpretiert werden und ob negative Effekte durch zusätzliche Verkehrsteilnehmende in der Interaktion entstehen. Die vorliegende Online-Video-Studie untersuchte drei verschiedene eHMI-Designs im Hinblick auf die Querungsintention der Teilnehmenden in einem urbanen Szenario mit mehr als einem interagierenden Fußgänger. Hierbei wurden die Position und Präsenz des zusätzlichen Fußgängers variiert. 61 Probanden machten Angaben über das Querungsverhalten mit Fokus auf Querungsbereitschaft, Entscheidungssicherheit und dem Eindruck von dem eHMI adressiert worden zu sein. Die Ergebnisse zeigten, dass

Position und Präsenz des zusätzlichen Fußgängers keinen signifikanten Einfluss auf die Querungsintention der Teilnehmenden hatten. Außerdem hätten signifikant mehr Probanden die Straße überquert und fühlten sich mehr adressiert, wenn sie mit einem gerichteten eHMI interagierten, verglichen mit einem ungerichteten oder mit einem AV ohne eHMI. Insgesamt zeigte sich, dass die gerichtete Adressierung von Fußgängern via eHMI auch in komplexeren Situationen aufrechterhalten werden konnte.

Electrophysiological markers of saliency-dependent visual-working-memory processing

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Visual working memory is an essential tool to process our constantly changing world. In our previous work, using dense displays adapted from the visual-search literature, we demonstrated that saliency heavily influences visual working memory performance (Constant & Liesefeld, 2021). In the present work, we performed two EEG experiments (16 German participants each) with the same paradigm to potentially gain more detailed information on the cognitive mechanisms by which saliency affects visual working memory performance. Participants were presented for 350ms with an array of 33 vertical bars and 3 tilted target bars (12°, 28° or 45°). After 1 second, one of the targets was probed and participants recalled its color. In the first experiment, all targets of a given memory display shared the same tilt. The N2pc, an ERP component indexing attentional allocation, was larger for more salient displays. In the N2pc time range, we also observed that increasing saliency significantly reduced the evoked lateralized theta power over the same parieto-occipital electrodes. The CDA, an ERP component indexing visual working memory storage, also increased marginally with saliency. Thus, it seems saliency mainly influences performance via an enhanced attentional allocation. In the second experiment, memory displays contained three targets, each with a different saliency level, and aimed to reveal more complex dynamics. Notably, it showed that, when in competition with more salient targets, the least salient target produces very little lateralized activity, maybe because it is not attended nor stored. We also tried to generalize a new approach to deconfound ERPs in complex displays.

Embodied cognition in multitasking: Effects of hand position on crosstalk effects in temporally overlapping tasks

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In contrast to traditional dualistic views of cognition, visual stimulus processing is not independent of bodily factors such as hand positioning. For example, reduced crosstalk between two temporally overlapping tasks has been observed when stimuli are presented near the hands as compared to far from the hands. This result indicates hand-specific attentional processing enhancements which support a more serial rather than parallel

processing of the two tasks. To further elucidate how these hand-specific processing modulations affect multitasking performance, the present study consisted of three interrelated crosstalk experiments. Experiment 1 manipulated vertical stimulus-hand distance and stimulus-effect distance orthogonally, with results demonstrating that hand distance rather than effect distance drives the crosstalk reduction. Eexperiment 2 manipulated the physical distance between both hands (i.e., horizontal stimulus-hand & hand-hand nearness), with results showing weakly increased crosstalk when both hands are close to each other. Taken together, Experiments 2 and 1 support the notion of hand-specific attentional processing benefits which can either lead to more serial or more parallel processing of multiple stimuli in view, depending on whether the attentional hand foci of both hands overlap. Experiment 3 is preregistered and currently being run to test this interpretation rigorously. In this experiment, employing an orthogonal manipulation of horizontal nearness and vertical distance, we expect opposing influences of both factors, that is, increased crosstalk for horizontal nearness (replicating Experiment 2) and decreased crosstalk for vertical distance (replicating Experiment 1 and previous work).

Embodied language production: Is speaking shaped by experientially grounded meaning?

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How is language production shaped by our sensory-motor experiences? During verbal communication our sensations and (bodily) experiences are frequent topics of conversation. However, while some meaning relations as categorical, associative or thematic links are known to form the basis for lexical-semantic processing during language production, little is known about whether and how lexical selection during speech planning is shaped by sensorimotor experiences. I will present experiments on the role of experientially grounded meaning during lexical-semantic processing. The results suggest that experiential traces form one aspect of the many facets of meaning that determine which words we select to express an intended meaning. I discuss the relation between experience-related meaning and traditionally investigated semantic factors in language production research and conclude with a discussion of the difficult distinction between "semantic" and "embodied" manifestations of sensorimotor experiences in language production.

Emotional reactivity to music: A mediating factor for developing musical abilities

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Researchers widely agree that the development of musical abilities is a very complex process involving many different factors. In the present contribution, we propose to consider emotional reactivity to music as one of them. While the strong interconnectedness between music and emotions is widely accepted, intriguingly, they have not been taken into account yet in the context of musical ability development. Our study aims, based on ideas

of musical ability development and theories about music and emotions, to analyze the relationships between emotional reactivity to music with musical engagement and musical perception abilities. The sample consisted of 127 adults (77.2% female, age: $M = 25.12$ ($SD = 7.02$)), and the procedure involved participants listening to 15 relatively unknown soundtrack excerpts. Prior to the music excerpt exposure, participants' musical engagement was obtained through self-report. Afterwards, emotional reactivity to music was operationalized during the music excerpt exposure through self-reports on arousal and valence as well as skin conductance response and heart rate. Finally, participants' musical perception abilities were assessed using an adaptive test battery. The findings showed that the measures of emotional reactivity to music were significantly correlated with the indexes of musical engagement such as music listening or musical training and practice (r between .18 and .30, all $p \leq .05$), which in turn were significantly correlated with musical perception abilities (r between .19 and .59, all $p \leq .05$); but musical perception abilities and emotional reactivity to music were uncorrelated. We conclude that emotional reactivity to music is relevant for engaging in musical activities and thus a potentially important precursor of musical ability development.

Emotions and cognitive effort – but not source credibility – determine news-based social judgments

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Misinformation in news headlines is rampant and can have substantial influence on our social judgments. We show that when people derive social judgments from person-related news, they rely to a large extent on the emotional contents of news, apparently unperturbed by its credibility. With the aim to examine the yet unknown cognitive-emotional mechanisms that help explain this bias, we combine two approaches to investigate what determines news-based social judgments. We investigate pupil dilation to test what aspects of news are salient when deriving social judgments, and we investigate the confidence with which social judgments are made. Thirty participants viewed websites of well-known trusted or distrusted news media sources exhibiting headlines about unfamiliar persons. In a following test phase, headlines with emotional rather than neutral contents led to faster and more extremely valenced social judgments, and higher confidence in those judgments. Pupil dilation was lower for emotional compared to neutral news. Only pupil dilation was sensitive to media source credibility, such that neutral headlines from distrusted sources led to the highest pupil dilation. This pattern of results is consistent with a cognitive rather than affective explanation of the pupil dilation effects. Emotional contents thus enhance confidence in social judgments even if based on untrustworthy news. Meanwhile, cognitive resources to evaluate the credibility of news may primarily be allocated when emotional contents driving confident decisions are not available. Understanding these mechanisms can help empower people to consider credibility as a protection against false news biasing their judgments.

Employing a complex decision task to study error processing in perfectionists

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Cognitive processes in perfectionists – i.e. humans who strive for flawlessness – have previously been studied in relatively simple experimental tasks like flanker tasks. However, given that these tasks are not overly challenging, they may not target perfectionistic dispositions as effectively as more challenging tasks. To address this issue, we developed and employed a complex decision task with eight response options to study error processing (reflected by two components of the event-related potential: error/correct negativity – Ne/c; error/correct positivity – Pe/c), error detection and post-response adaptation in perfectionists. We distinguished two key dimensions of perfectionism: personal standards perfectionists (PS) strive for flawlessness because of an intrinsic motivation to set and achieve high goals, while evaluative concern perfectionists (EC) do so because they fear to be negatively evaluated by others. We found that although EC perfectionism was related to indicators of increased preoccupation with errors, high-EC perfectionists made more errors than low-EC perfectionists. This observation may be explained by insufficient early error processing as indicated by a reduced Ne/c effect and a lack of post-response adaptation. PS perfectionism had a moderating effect on the relationship between EC perfectionism and early error processing. Our results provide evidence that pure-EC perfectionists may spend many of their cognitive resources on error-related contents and worrying, leaving less capacity for cognitive control and thus producing a structural lack of error processing. Employing a more complex decision task than previous studies elicited a clearer pattern of behaviour, especially in EC perfectionists.

Endorsement and embodiment of implicit age stereotypes: Believing older adults being cautious makes older adults cautious

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In 166 young ($n = 84$; $M_{\text{age}} = 22.9$ years) and old adults ($n = 82$; $M_{\text{age}} = 68.6$ years), we assessed their implicit endorsement of age stereotypes of old (young) people being cautious (daring) with the propositional evaluation paradigm (PEP; Müller & Rothermund, 2019). To investigate embodiment effects of implicit age stereotypes on behavior, we examined whether implicit endorsement of in-group stereotypes predicts cautious behavior in young and old people. In both age groups, we found endorsement of implicit age stereotypical beliefs for both age groups, with old participants showing even stronger endorsement of both, in-group and out-group stereotypes. Regression analyses revealed that among older participants, stronger endorsement of the stereotype that old people are cautious predicted increased accuracy motivation (parameter a of a diffusion model analysis) in a speeded response time task. The effect remained significant after controlling for explicit endorsement of the stereotype, indicating incremental predictive validity of implicitly

endorsed in-group stereotypes on behavior. No effects of self-stereotyping on behavior were observed among young participants.

Enriching haptic experiences using sensory illusions

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A growing body of work in human-computer interaction (HCI), in particular work on haptic feedback and haptic displays, relies on sensory illusions to alter and enrich the experience during interaction. Our work provides an overview of how sensory illusions can create haptic feedback as well as how they are applied in HCI and evaluated. We moreover identify current trends, research gaps and discuss ideas for possible research directions worth to be investigated. We show that while the types of illusions used to create haptic feedback for these systems have remained mostly the same, the underlying methods to create them have adapted to the increased pervasiveness of Mixed Reality technologies. Still, multimodal illusions or those addressing other senses than sight and touch have generally been underexplored. Future research may focus on the exploration of sensory illusions under more natural conditions and contexts, to gain a deeper understanding of how these could enhance our everyday lives.

Enthusiasm, flow and the voice – what happens in a magical number three learning condition?

Julia Bastian
Chemnitz University of Technology

How can enthusiasm in a learning environment be reached? Is an enthusiastic voice more effective to activate learning than a neutral or depressed voice? University students heard either an enthusiastic, a depressed or a neutral voice reading learning material. Participants were assigned to one cell of a three (enthusiasm: enthusiastic vs. neutral vs. depressive) factorial between-subjects design. Low and high mental load and effort in the working memory of the learner, a low and high extent of flow experience and the mood before and after the voice induction were explored according to the learning condition. Liew et al. (2015, 2017) and Beege et al. (2020) identified mental or cognitive load as a central moderator between enthusiasm and learning outcomes. According to their perspective emotions inevitably induce mental load. In accordance with the view of emotional response theory enthusiastic verbal and nonverbal cues of an instructor or teacher can induce higher positive emotional states in learners, which in turn, enhance affective perceptions, intrinsic motivation, cognitive outcome and enact learners' approach behaviours in the learning process. Contrary, in the view of cognitive load theory enthusiasm may increase extraneous cognitive load as an additional processing in the mind, which negatively impact emotion, affective perceptions, intrinsic motivation, and cognitive outcome. Additional insights into the boundary conditions of the effects of emotions on learning will be provided. Results, implications and suggestions for future research are discussed.

Erwartungsbasierte Bewertung impliziter Kommunikation manueller und automatisierter Fahrzeuge in Fahrzeug-Fahrzeug Interaktionen

Linda Miller & Martin Baumann
Ulm University

Interaktionen zwischen Fahrzeugen stellen sicherheitskritische Situationen im Straßenverkehr dar, insbesondere wenn missverstandenes Fahrverhalten zu Konflikten oder deren Verschärfung führen. Automatisierte Fahrzeuge (AVs) versprechen eine Steigerung der Verkehrssicherheit, müssen sich jedoch in ein bestehendes sozio-technisches System integrieren. Dafür müssen AVs in der Lage sein, ihre Fahrintention eindeutig und verständlich an manuelle Fahrzeuge (MVs) zu kommunizieren. In einem videobasierten Online-Experiment ($N = 80$) wurde verglichen, wie sich die Bewertung impliziter Kommunikation mittels Fahrzeugbewegung ausgehend von initialen und aufgebauten Erwartungen zwischen AVs und MVs unterscheidet. In drei Video-Blöcken kam den Versuchspersonen ein AV oder ein MV an einer Straßenengstelle entgegen. Das entgegenkommende Fahrzeug kommunizierte wiederholt eine offensive oder defensive Fahrintention (Erwartungsinduktion) und die Versuchspersonen bewerteten verschiedene Fahrverhalten (erwartungskonform, nonkonform, ambivalent). Die Ergebnisse zeigten, dass von MVs initial eine offensive, von AVs hingegen eine defensive Fahrintention erwartet wurde. Zudem wurde bei MVs offensives Fahrverhalten anfänglich schneller erkannt, bei AVs hingegen defensives Fahrverhalten. In späteren Durchgängen wurde sowohl bei MVs als auch bei AVs defensives Fahrverhalten am schnellsten erkannt und am positivsten bezüglich Eindeutigkeit, Komfort, Vertrauen und Workload bewertet, wobei die induzierte Erwartung die Bewertung beeinflusste. Die Ergebnisse betonen den Einfluss von (initialen) Erwartungen auf die Bewertung von Fahrzeugverhalten sowie die Übertragbarkeit von impliziten Kommunikationsstrategien zwischen MVs und AVs.

Escaping fixation and mental set

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By definition, insight problems lead to some amount of fixation because the obvious solutions that come most easily to mind are not viable. Hence, during the course of solution, insight problems often lead to impasse. Importantly, to achieve solution some restructuring or re-representation is required. This presentation will discuss research on escaping fixation and mental set, and which contexts and conditions may improve the chances of insightful solution. These contexts and conditions often include exposing individuals to hints and exploring the benefits of incubation periods, as well as individual differences that might also impact solution rates. In particular, although expertise is generally beneficial for problem solving, in some cases it can lead to mental set or fixation when prior knowledge and experience strongly prime incorrect solutions. Under these conditions, experts are more likely to perseverate in incorrect solution attempts or selectively search in areas that will not lead them to solution. Another key individual difference is work-

ing memory capacity, which also is generally beneficial for problem solving. For many reasons, individuals with higher working memory capacity are generally better able to solve analytic problems. For example, they are better able to focus their attention on planning, tracking subgoals, maintaining partial solutions, monitoring progress, and executing resource-demanding steps. Yet, there are also some cases in which too much focus can lead individuals to perseverate on incorrect solution attempts. What seems clear is that some sort of flexibility is needed for insight. The perplexing open question is how to best promote, capture, measure, or predict the flexibility that allows for insightful solutions.

Estimating (guessing-corrected) speed of item and source memory: Extension of two-high-threshold multinomial model of source monitoring

Hilal Tanyas, Beatrice G. Kuhlmann, & Edgar Erdfelder
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The two-high-threshold multinomial processing tree model of source monitoring (2HTSM; Bayen et al., 1996) disentangles underlying memory and guessing processes and provides guessing-corrected measures for item and source memory performance. The standard model parameters are estimated on the basis of the frequencies of correct and incorrect attributions on a source-monitoring test. Recently, Heck and Erdfelder (2016) extended multinomial processing tree (MPT) models to response times (RT) data. Inspired by their MPT-RT approach, we developed their rationale for the source-monitoring paradigm to measure speed parameter estimates that are specific to item and source memory, respectively. We determined thresholds to categorize continuous source-monitoring response time data into discrete bins from fast to slow responses separately for each individual. Next, we calculated frequencies for all combinations of discrete attribution responses and RT bins, first within and then summed across participants. This newly proposed RT-extended 2HTSM model indeed fits empirical source-monitoring data and presents separate parameter estimates for memory- and guessing-based latency. We will discuss how item and source memory speed parameters can inform theories about the dependency of item and source memory.

Evaluating the predictive power of cognitive reasoning models

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The way how humans' reason about information has led to the development of more than 12 cognitive theories in the domain of syllogistic reasoning. A syllogism consists of two quantified statements about sets, e.g., 'Some architects are beekeepers', 'Some beekeepers are rich' and the task is to derive a conclusion. While some cognitive theories can explain aggregated-level statistical effects, the question remains still open, about their predictive power for single humans, i.e., how good cognitive models can explain an individual reasoner. This calls for evaluations by additional psychological experiments

that are able to test the respective power of cognitive models and features of cognitive models for model selections.

Evaluation der kamerabasierten Emotionsanalyse der TAWNY Emotion AI in einer Fahrsimulatorstudie

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Das vom BMWi geförderte Projekt RUMBA möchte das Fahrerlebnis für die Insassen während einer vollautomatisierten Fahrt (SAE L4) neu gestalten. Ein Teilziel hierbei ist, Erfassungsmethoden der User Experience (UX) neu zu entwickeln. AI-basierte Emotionsanalyse wird im Bereich der UX bereits als Messinstrument z. B. für Flow erforscht (Maier et al., 2019). In der hier beschriebenen Studie soll die Emotionsanalyse der TAWNY Emotion AI sowie ihr Nutzen als UX Messinstrument im Rahmen des Autofahrens in einer Simulationsstudie evaluiert werden. In der Studie werden vier verschiedene Strecken (durch die bestimmte Emotionen induziert werden: Konzentration, Langeweile, Freude, Überraschung) von 24 Studierenden im statischen Fahrsimulator durchfahren. Die Probanden sowie die Fahrtstrecke werden während der Fahrt aufgenommen und die subjektiv erlebte Emotion wird im Anschluss an jede Strecke durch Selbsteinschätzung des Probanden erfasst. Diese setzt sich aus dem Self-Assessment Manikin (SAM; Bradley & Lang, 1994) und einem emotionsspezifischen Fragebogen zusammen. Zudem werden einzelne Facetten der UX der Fahrt erfragt. Ergänzt wird eine Fremdeinschätzung zum Emotionserleben durch Beobachter. Die Daten werden mit den Emotionsdaten der kamerabasierten Emotionsanalyse der TAWNY Emotion AI (Facial Coding) verglichen und auf Zusammenhänge geprüft. Im Beitrag werden die Ergebnisse der derzeit laufenden Studie berichtet.

Evaluation of simulated recognition aids for human sensemaking in applied surveillance scenarios

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In surveillance operations, accurate mental models must be constructed to make effective decisions, which requires making sense of dynamic information as it unfolds. For intelligence analysts, sensemaking is challenging because it frequently involves making inferences about uncertain data. One way to enhance sensemaking may involve collaboration from a machine agent such as Project Maven, an established algorithm that directs analysts' attention to people and vehicles in scenes. We simulated actions of a Project Maven as well as that of a machine agent that directed attention to EEIs. Sensemaking was assessed by measuring participants' ability to predict events and identify signs. We found that simulated agents directing participants' attention to EEIs improved EEI identification but directing attention to people and vehicles (emulating Project Maven) did not. Participants' higher-order sensemaking was not enhanced by either type of machine agent. This demonstrates that guiding attention to features in a scene improves iden-

tification whereas indiscriminate steering of attention to entities in the scene does not improve understanding the holistic meaning of events. These results contribute to our goal of determining which human-machine systems improve the sensemaking capability of intelligence analysts in the field.

Evaluative consequences of sampling distinct information

Hans Alves
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People's impressions, attitudes, and judgments necessarily rely on samples of information. I introduce a sampling principle according to which people seek distinct information that is rare and diverse, and that allows to differentiate between contexts, objects, people, or groups. Among distinct information samples, however, negative information is over-represented. This follows because in most information ecologies, negative compared to positive information is less frequent, but more diverse. Consequently, when perceivers sample distinct information, resulting impressions, attitudes, and judgments will be negatively biased.

Evaluative effects of (in)congruent advice in a repetition-induced truth effect paradigm

Anne Irena Weitzel & Christian Unkelbach
University of Cologne

The repetition-induced truth effect describes people's tendency to believe repeated statements more than novel statements (Unkelbach et al., 2019), as studied by a broad corpus of literature (for a meta-analysis, see Dechêne et al., 2010). The effect is robust even when participants receive valid advice at the time of judgement (Unkelbach & Greifeneder, 2018). We extended this paradigm consisting of a presentation phase (participants see randomly sampled statements) and a judgment phase (participants judge both the previously seen and new statements) with advisors, differentiating between congruent advisors (i.e., claiming repeated statements to be true; new statements to be false) and incongruent advisors (i.e., claiming repeated statements to be false; new statements to be true). Following a referential, coherence-based approach (Unkelbach & Rom, 2017), we predicted and found that incongruent advisors are perceived as less likeable, less trustworthy, and less intelligent. A series of five studies (total $n = 1,446$) showed that this evaluative effect holds for advisors giving a subjective estimation of confidence in their advice (Experiment 1) as well as advisors labelled with an objective advice validity (Experiment 2), male advisors (Experiment 3) as well as female advisors (Experiment 4). Furthermore, we verified our assumption that this differential evaluative effect of (in)congruency is mainly due to advisors' advice to repeated statements (Experiments 3-4). In Experiment 5, we extended the devaluation effect on incongruent advisors with a behavioral DV: When given the choice, participants significantly preferred advice from congruent advisors. We discuss implications of these evaluative and behavioral effects (e.g., for combating fake news).

Event-related potentials for habitual and non-habitual grasp planning

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Human manual actions are selected based on object properties but also goal-directed and habitual constraints. Although the goal-directed constraints have extensively been studied, little is known about the habitual constraints. In this experiment, we investigated the neurophysiological mechanisms of grasping habits during motor planning. Twenty-two right-handed volunteers were asked to grasp a handle (habitually or non-habitually) and then rotated the handle (i.e., the end with a pointing marker) to a target position. In the habitual trials, participants grasped the handle with their thumb toward the pointing marker. In the non-habitual trials, participants grasped the handle with their thumb away from the pointing marker. Movement timing parameters (reaction, reach, and rotation time) and movement-related cortical potentials (MRCPs) were recorded. Behaviorally, reaction, reach, and rotation times were shorter for habitual than for non-habitual grasping (all $F(1, 21) > 7.3$, all $p < .05$). Neurophysiologically, in the time window 500ms before movement onset, posterior MRCPs were more negative-going for the non-habitual than for the habitual grasping (t(21) = 3.87; p < .001). Anterior MRCPs were similar between habitual and non-habitual grasping ($t(21) = 0.98$, n.s.). Furthermore, the mean amplitude of posterior MRCPs was negatively correlated with the reaction time for right-hand movements in the preparation of both habitual ($r(20) = -0.45$; $p < .05$) and non-habitual grasping ($r(20) = -0.52$, $p < .05$) but not for left-hand movements (all $r(20) < 0.1$, n.s.). Our results suggest that movement preparation is affected by grasping habits. Instead of the anterior MRCPs, the posterior cortical activities during movement preparation are suggested to represent the grasping habits.

Exemplar retrieval in preferential judgments

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Research on inferential judgments from multiple cues suggests that judgments are influenced by the retrieval of past instances (exemplars) stored in memory. Yet, on the process level little direct evidence exists that would allow a similar conclusion for preferential judgments, where there is no objective criterion to which a judgment can be compared. This study aimed to test if exemplar retrieval also plays a role in preferential judgments. In Experiment 1, half of the participants judged how much they would like smoothies consisting of different ingredients (preference condition) and the other half judged how much another person would like the presented smoothies (inference condition). In Experiment 2, all participants engaged in preferential judgments, but with or without instructions to respond as consistently as possible. To get direct evidence of exemplar retrieval, we recorded eye movements. Eye movements can be used to trace information search in memory, because when retrieving information, people look at spatial locations that have been associated with retrieval-relevant information but that are empty during

judgment of new objects ("looking-at-nothing" behavior). The results show that people looked at exemplar locations in both inferential and preferential judgments, and both with and without instructions to respond as consistently as possible. Thus, the results suggest that people may rely on previously encountered exemplars also in preferential judgments and highlight the usefulness of studying eye movements "to nothing" to better understand the role of memory in judgment.

Experimental evaluation of a drift-diffusion model for vehicle deceleration detection among pedestrians

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As part of the research on automated vehicles, the investigation of the interaction between automated vehicles and vulnerable road users (VRUs), such as pedestrians or cyclists, proved to be crucial. Especially in low-speed areas (e. g. parking lots, shared spaces), where traffic is less regulated, vehicle deceleration represents an important implicit communication signal to indicate giving priority to a VRU. However, previous findings showed that the pedestrians' vehicle deceleration detection varies depending on situational factors (e.g., TTA, vehicle size, vehicle speed). To understand the cognitive processes behind these differences in perceptual decision-making on vehicle deceleration detection, we propose a Drift-Diffusion Model (DDM; Ratcliff, 1978). This computational model decomposes empirical data on detection reaction times and accuracies into the underlying cognitive components. Both top-down (e.g., expectations, cautiousness) and bottom-up processes (e.g., stimulus encoding, evidence quality) of human information processing are considered. In this talk, we provide an overview of the DDM and evaluate the model predictions using empirical behavioral data. For this, we use results from an experiment in which participants indicated whether an approaching vehicle decelerates or not. Both situational factors and the use of explicit communication signals were varied and the influence on the DDM parameters was investigated. The results may contribute to the design of a user-friendly interaction that can have a positive impact on the perceived safety and satisfaction of pedestrians.

Experimental evidence for feedback inflation and the positive feedback bias: Judgments of vs. feedback to students with German and Turkish names

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Feedback is a central tool for learners to understand how they can improve (Hattie, 1999) and it therefore needs to be accurate. However, feedback is also an inherently interpersonal situation (Müller & Ditton, 2014). Compared to an initial non-communicated judgment, teachers may therefore adjust their feedback to make it more palatable and motivating. However, the difference between non-communicated judgments and feedback may be greater for students belonging to negatively stereotyped groups. Prior

research has established a persistent negative bias towards ethnic minority students in non-communicated judgments (e.g., Sprietsma, 2013) and a positive bias in feedback thought to be elicited by the concern that criticism may reflect prejudice (e.g., Harber et al., 2010, 2012). We tested these hypotheses using a 2 (migration background: Turkish vs. none; within subjects) × 2 (evaluation condition: judgment vs. feedback; between subjects) design in a sample of 132 German teacher students. After being randomly assigned to the judgment/feedback condition, participants each judged/gave feedback on two essays supposedly written by a student with a Turkish vs. German name. A pilot ($n = 20$ teacher students) had shown that both essays were of the same low quality. Mixed ANOVAs showed that participants in the feedback condition gave better grades, were more positive in their ratings, and included more positive comments in their open text than participants who simply judged the essays. Moreover, participants were more positive in their impressions of the student with a Turkish compared to the student with a German name—unexpectedly, this was the case in both judgments and feedback. We discuss implications of these findings for students, e.g., their self-assessment and motivation.

Explicit but no implicit sense of agency for color changes

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Julius Maximilian University of Würzburg

The experience to be in control of one's actions and their outcomes is called sense of agency. We wanted to investigate whether subjects feel sense of agency for the color change of a stimulus that they have caused themselves . In two experiments, participants changed the color of certain stimuli by either pressing the corresponding key (study 1) or by fixating the chosen stimulus (study 2). The color change happened after a certain delay contingent to participants' actions (Agency condition). As a baseline, we also implemented stimuli that changed their color continuously and independent of participants' actions after random intervals during the whole trial (Random condition). Participants should experience agency for the color change of stimuli in the Agency condition, but not for the color change in the Random condition. We analyzed explicit agency ratings, as well as interval reproduction errors as a measure of temporal binding. We found higher agency ratings for color-changes when participants believed that they had caused the color-change compared to the condition in which they believed they had no control over the color-change. Surprisingly, we found stronger temporal binding for color changes for which they felt weaker agency compared to color changes for which they felt stronger agency. These findings indicate, in line with previous studies, that explicit and implicit agency measures cannot be used interchangeably and rather suggest that temporal binding might capture other processes than agency or in addition to agency.

Exploring the cognitive basis of social learning in human evolution

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Human cognitive ability is extraordinary, if not unique, in that it allows us to generate, transmit, and preserve knowledge and information, supporting an elaborate system of cumulative culture. Understanding the processes involved in human-specific social learning is therefore key to explaining both human cognitive evolution and cumulative culture. One of the biggest challenges for researchers is untangling and operationalising the mechanisms upon which social learning depends, such as imitation, pedagogy and copying fidelity, using experimental tasks that are 'evolutionarily valid'. We follow the hypothesis that human cognition is built upon basic primate perceptual-motor abilities specialized for human tool-use and production, involving frontoparietal systems that underlie learning and transmitting human technologies (Stout & Hecht, 2017). Testing this hypothesis requires studying how different technologies pose distinct cognitive demands and how these, in turn, affect their transfer. We present a transmission chain study combined with neuroimaging (fMRI) using evolutionary relevant, archaeologically grounded behaviours (knot-making and geometric design production). By examining brain activation patterns in acquiring and transferring knowledge in these domains, and the potential variations generated in the process, we aim to offer new insights on the cognitive and behavioural demands of these technologies and their effects on cultural evolution.

Externe Kommunikation von automatisierten Fahrzeugen im Mischverkehr: Die Adressierung des richtigen menschlichen Interaktionspartners

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Bisher konzentrierte sich die Entwicklung externer Kommunikationskonzepte für automatisierte Fahrzeug (AV) auf Szenarien, in denen ein AV mit einem einzelnen weiteren Verkehrsteilnehmer (Autofahrer oder VRU) interagiert. Relevant sind jedoch vor allem Interaktionen mit mehr als einem Verkehrsteilnehmer. Daher wurde eine Studie mit einer Multi-Agenten-Simulation durchgeführt, in der ein AV gleichzeitig mit zwei Probanden, einem Fußgänger und einem Fahrer eines manuellen Fahrzeugs, interagierte. In dieser Studie wurden zwei Hauptszenarien untersucht, um die Sicherheit und Effizienz im Verlauf der Interaktionen zu bewerten. In einem Szenario sollte der Fußgänger die Straße vor dem automatisierten und dem manuellen Fahrzeug überqueren, die sich von verschiedenen Seiten näherten. Im anderen Fall sollte das manuelle Fahrzeug vor dem entgegenkommenden AV durch eine Engstelle fahren, während der Fußgänger die Straße überqueren sollte, nachdem beide Fahrzeuge vorbeigefahren waren. Das Kommunikationskonzept des AV bestand aus impliziten Signalen mittels eines Geschwindigkeitsprofils und eines seitlichen Versatzes innerhalb des Fahrstreifens sowie aus expliziten Signalen mittels einem externen HMI. Die Ergebnisse der Studie zeigen, dass in Bezug auf die Sicherheit

keine Kollisionen beobachtet wurden und keine signifikanten negativen Auswirkungen auf die Effizienz gemessen wurden. Im Gegensatz zu Untersuchungen mit einem Probanden fühlte sich jedoch die Mehrheit der Probanden in Situationen, in denen das automatisierte Fahrzeug dem anderen menschlichen Verkehrsteilnehmer die Vorfahrt signalisiert, falsch angesprochen. Daraus lässt sich schließen, dass das Kommunikationskonzept des AV geändert werden sollte, um spezifisch einzelne Verkehrsteilnehmer eindeutig ansprechen zu können.

Eye movement patterns in complex tasks: Characteristics of ambient and focal processing

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TU Dresden

Analyzing the time course of eye movements during scene viewing indicates that people progress through two distinct modes of visual processing: an ambient mode, serving global spatial orientation in the visual environment, followed by a focal mode, facilitating a more elaborated and object-centered analysis. However, the shifts between ambient and focal processing modes have mainly been identified relative to environmental changes like the onset of various visual stimuli, scene cuts, and subjective event boundaries in dynamic stimuli. The results so far do not allow conclusions about the nature of ambient to focal processing beyond the influence of externally triggered events. It remains unclear whether people shift back and forth from ambient to focal processing also based on internal triggers, such as the shift within and across the processing of tasks without external events. In our study, ambient to focal attention was investigated in an active task solving paradigm. The used Rubik's Cube task is a multi-step goal-driven task, which can be broken down into smaller sub-tasks that are performed serially. The time course of eye movements was analyzed across different levels of task processing with and without visual changes in the task environment. The results suggest that initial ambient gaze patterns are followed by a switch to more focal viewing across many levels of processing. More importantly, the ambient to focal processing works as the basic attentional mechanism in task processing, which does not seem to be influenced by changes in task performance. The present findings suggest that ambient and focal eye movement characteristics might serve as a probe for the attentional state in task processing. Future work should therefore focus on more applied settings.

Eye-tracking as a method to investigate music listening experiences

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Max Planck Institute for Empirical Aesthetics

The experience of being absorbed in music is a particular aesthetic experience that has been investigated with a variety of self-report scales. Absorption has been related to attentional capacity directed at processing an aesthetic stimulus. The goal of our research is to relate self-rated musical experiences to ocular measures, such as pupil dilation,

blinking, and saccadic activity. Besides aesthetic absorption, we are interested in states and emotions like mind-wandering, groove, valence, arousal. We will report an overview of our studies from the last years. We recorded eye measures during music listening in varied settings, differing in instructions of fixation (fixation on central target or free viewing on an empty screen) and blink behavior (inhibited or spontaneous). On the coarse level of analyzing behavior on trial means, we found relations between feeling absorbed and mean saccadic activity, blink rate, and blink durations. Musical features also predicted eye parameters and the explained variance was independent of subjective states. On a more fine-grained level, taking the dynamics of the ocular measures into account, pupil dilation was related to musical structure and expectation violation. Further, various features of the pupil signal can predict different states. For example, phase coherence predicts absorption, while the number of pupil size changes predicts feeling in the groove. Most of our results have been replicated across three studies, though some show sensitivity to context settings.

False memory for abstract vs. concrete pictorial stimuli depending on their shared perceptual features

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Cardinal Stefan Wyszynski University in Warsaw

The aim of this research was to investigate memory processes that contribute to false recognition of distractors that share category and perceptual features (colours) with lists of targets. From the perspective of Fuzzy Trace Theory (FTT) (e.g., Brainerd & Reyna, 2002), we analyzed the processes underlying false recognition of pictorial stimuli. This theory assumes that two qualitatively different types of representations are encoded in parallel in memory; gist traces refer to the shared meaning of studied items and verbatim traces store item-specific and perceptual details. FTT postulates that semantically related distractors are falsely accepted since they share gist with targets; however, it is not clear how shared perceptual context (colour) information contributes to false recognitions. In our experiments, study materials belonged to categories determined by perceptual features (abstract shapes) or semantic features (types of door scenes). In the first condition, each category was associated with a specific colour, and in the second condition, all items were presented in grey-scale. For both materials, we found an increase in false recognitions for colourful pictures as opposed to black-and-white pictures. The data was analyzed using Multinomial Processing Tree models to delineate the role of phantom recollection and familiarity in the boost of false memory.

Fast and involuntary interactions between emotional vocalizations, emotional music, and facial emotions

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Saarland University

In a series of experiments, we investigated the influence of brief auditory affective context on visual affective processing to test possible underlying processes and their affective speci-

ficity. We used a multimodal variant of the evaluative and emotion priming paradigm (for the latter, see e.g., Rohr et al., 2012), and contrary to typical multimodal studies, we used brief sound durations (200–600ms) and stimulus-onset-asynchronies (0–200ms) in order to preserve the fast and involuntary character of the paradigm. Our first results showed emotion-specific priming effects between non-verbal vocalizations and facial expressions. As there is plausibly a strong associative relation between emotional vocalizations and facial expressions due to natural audiovisual co-occurrence and semantic relatedness, we tested whether these effects generalize to emotional music and faces. We presented brief (600ms long) excerpts of joyful, sad, anger or fear-related instrumental music as primes and emotional facial expressions as targets. Contrary to what is suggested by previous findings (e.g., Marin et al., 2012), there was an emotion-specific influence of brief musical context on the categorization of visual emotions. These results suggest that emotions that are automatically (i.e., fast and involuntary) conveyed by music can be represented similarly to social-communicative emotion categories in contrast to only arousal and/or valence. Furthermore, the study indicates that emotion-specific cross-modal interactions are not limited to strongly associated sounds and visual stimuli. Two further experiments varying the task provided hints that the underling processes are not limited to response bias; the possible processes will be discussed based on these experiments.

Fatigue and self-control: An emerging analysis of behavioral restraint intensity

Christopher Mlynski
University of Vienna

I will discuss an analysis concerned with fatigue influence on self-control, presenting findings from a recent study (experiment) designed to test it. The analysis argues that fatigue should not impact self-control directly, but rather should do so indirectly by determining how intensively people resist urges to act. It argues further that fatigue influence on the intensity is multifaceted, depending on the level of fatigue, the magnitude of the unwanted urge, and the importance of resistance. In theory, fatigue should have potential (1) for prompting people to resist urges more intensively, (2) for prompting people to give in to urges to act, or (3) for confirming people's pre-existing inclination to give in to urges to act. The analysis implies that fatigue should consistently impair control only under certain restraint conditions. It also addresses key concerns that have been raised in relation to the influential limited resource analysis of self-control developed by Baumeister and colleagues.

Field study regarding the work duration for the visual inspection of X-ray images of passenger baggage

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At airport security checkpoints, security officers (screeners) inspect X-ray images of passenger baggage for prohibited items. Because EU regulation limits continuous inspection

to 20 minutes, screeners typically thereafter change to another task at the checkpoint. With a new technology, remote screening, the task of X-ray image inspection is conducted in a separate room away from the checkpoint. This makes it operationally challenging to maintain the task rotation at 20-minute intervals. The question arises whether screeners can inspect X-ray images for longer periods of time and how this affects their performance and well-being. In a field study at a European airport, two groups of screeners inspected X-ray images of cabin baggage over a four-month period. One group analyzed X-rays for 20 minutes and then moved to a different work position (control group), while the other group analyzed X-rays for up to 60 minutes (experimental group). A group comparison showed that screeners did not differ on various performance measures (hit rate, reject rate, or processing time). The examination of the screening sessions conducted by the experimental group revealed that when the workload was low or average, the screeners were able to maintain their performance for up to 60 minutes. However, if the workload was high, the hit rate dropped significantly. In interviews and questionnaires, screeners reported that they usually had difficulties in maintaining attention after 30 to 40 minutes. Our results imply that longer screening sessions between 30 to 40 minutes could be tested and introduced. Thereby it is advisable to monitor and set a minimum hit rate that should be achieved during these prolonged screening sessions.

Framing cognitive offloading in terms of gains or losses: Achieving a more optimal use of reminders

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Individuals frequently offload reminders onto external resources, such as smartphones, rather than using internal memory. This decision between setting reminders or using internal memory is biased, with individuals setting more reminders than optimal. We investigated whether this reminder bias depends on reminders being framed in terms of gains or losses with two experiments. Participants applied the risk-averse strategy of using reminders over internal memory more than optimal under gain framing, thus replicating previous research. Under the novel loss-framing condition that we applied in our present experiments, participants were less biased toward reminders and more likely to use the risk-seeking option of using internal memory. Although the framing of reminders in terms of losses reduced the reminder bias, participants still showed a significant bias toward using reminders more than optimal. In our second experiment, we also collected metacognitive measures. The reminder bias increased the more underconfident participants were about their memory abilities in both framing scenarios. Framing did not alter this relationship but provided an additional influence. We conclude that framing reminders in terms of gains or losses alters individuals' offloading decisions. When trying to achieve a more optimal offloading behavior, framing should thus be considered an additional factor, in addition to cognitive effort and metacognitive judgments.

Gaze and speech behavior in parent-child conversations

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In this study, we investigated gaze behavior and its relation to speech during video-mediated face-to-face conversations between parents and their preadolescent children (8-10 years). 81 parent-child dyads engaged in two brief conversations about cooperative and conflictive family topics. We used eye tracking, audio-, and video-recordings to assess what regions of the face are looked at during episodes of speaking and listening, and whether patterns of gaze and speech were influenced by the topic of conversation. Regarding speech, our results show that children spoke more in the cooperation-scenario whereas parents spoke more in the conflict-scenario. Regarding gaze, we found that both parents and children looked more at the other's mouth region while listening compared to while speaking, which converges with previous studies about face scanning during speech perception. Furthermore, we found that parents gazed slightly more at the eyes of their children in the conflict-scenario compared to the cooperation-scenario. Results are discussed in terms of the role that parents and children take during cooperative and conflictive interactions, and how gaze behavior may support and coordinate such interactions.

Gaze tracking in virtual reality for AI locomotion prediction

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Motor actions towards a behavioral target are usually preceded by eye movements in the same direction. During walking, eye movements serve to identify targets and to inspect the ground for safe foot placement. This makes gaze data a useful signal for estimating locomotion intentions. We used machine learning to create indoor path prediction models and examined the question of whether eye tracking data provides additional benefit to such models. In our experiment, eighteen participants walked through a virtual environment that included several natural walking tasks, such as avoiding or approaching objects, walking around curves, and performing a search. We collected position, orientation, and eye-tracking data and used these features as input to a model that predicted a person's future position. Our results showed that the benefit of eye movement data was particularly evident in situations including changes in walking speed. Predicting future walking targets offers great opportunities to improve virtual reality applications, such as redirected walking, to make better use of the available tracking area.

Generating self-explanations: Self-generating new inferences, not paraphrases, boosts learning

Benjamin Harders & Mirjam Ebersbach
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The present study investigated whether the positive effect of generating self-explanations on learning can be attributed to the generation of new relations between given facts or also emerges when paraphrases are generated by the learners. In a laboratory experiment, 118 participants generated self-explanations either on the basis of a text (a) that already contained relations between individual facts (complex condition) or (b) that presented the same facts in an unrelated manner (simple condition). There was no difference between the two conditions regarding the number of generated self-explanations in the learning phase. In a memory test after one week, participants were asked to judge facts referring to the original text as being true or false. Participants who had read the simple text performed better in the test than participants who had read the complex text ($d = .32$). The number and type of self-explanations and their relation to the performance in the test were analyzed. The number of self-explanations generated in the learning phase predicted the performance in the test only in the complex condition, but not in the simple condition. In addition, the number of paraphrases did not predict test performance. Thus, the self-explanation effect in the complex condition can be attributed to self-generation only, not to paraphrasing. Potential explanations for the finding that the self-explanation effect was absent in the simple condition, even though participants in this condition outperformed participants in the complex condition regarding learning success, are discussed.

Good time, bad time: Do people invest processing effort adaptively in decision making with opportunity costs?

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When making choices, deliberation time is often costly but also promises to improve decision making. This, however, only applies if the available options differ in attractiveness, as additional processing time might not be worthwhile if the options yield similar value. We investigate to what extent people respond to the costs and benefits of time adaptively under varying value differences between options in decisions under risk. To study this trade-off between costs and benefits of time, we used the drift diffusion model (DDM) as a computational framework. Based on simulations, we first determined how people should adapt their boundary separation in order to maximize payoffs depending on the differences in options' value and the magnitude of opportunity costs (i.e., loss in payoff per time unit). Subsequently, we conducted three empirical experiments (total $N = 453$) to study if people adjust their processing adaptively, in line with the simulations. Across all experiments, participants' estimated boundary separations were mostly sensitive to the presence (vs. absence) of opportunity costs, but less so to different levels of costs and varying differences in option value. As a result, people did not adapt their boundaries to the value differences in an optimal fashion, with boundaries being narrower than optimal

when value differences were relatively large and wider than optimal when value differences were relatively small. Although guessing (i.e., very narrow boundaries) would have been most beneficial in some conditions, participants did not adopt a guessing strategy in any condition. In conclusion, people seem to have limited abilities to adjust their information processing adaptively to the magnitude of the opportunity costs and value differences.

Gutes bevorzugen oder Schlechtes vermeiden? Anziehende und abschreckende Effekte in der Routenwahl von Radfahrenden

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Die Routenwahl von Radfahrenden zu verstehen ist essentiell für ein effizientes Verkehrsmanagement, die Verbesserung der aktuellen Radverkehrsinfrastruktur und somit auch für die allgemeine Förderung des Radverkehrs. Bisherige Studien haben bereits Routenattribute identifiziert, die für eine bestimmte Route motivieren oder von ihr abschrecken können. Allerdings wirkt dabei nicht das Attribut selbst (z.B. Verkehrsaufkommen) als Motivator oder als Abschreckung, sondern eher dessen Ausprägungen (z.B. hoch oder niedrig). Frühere Studien untersuchten jedoch oft die Auswirkung nur einer Ausprägung pro Attribut. Das Ziel dieser Studie ist es daher, von verschiedenen Attributen jeweils beide Ausprägungen hinsichtlich ihrer motivierenden oder abschreckenden Wirkung zu untersuchen und miteinander zu vergleichen. In einem Onlinefragebogen wurden Teilnehmende nach der maximalen Fahrzeit der motivierenden, bzw. abschreckenden Ausprägung gefragt, während ihnen die Fahrzeit der jeweils anderen Ausprägung vorgegeben wurde. Ergebnisse der Differenz der beiden Fahrzeiten deuten darauf hin, dass die abschreckende Ausprägung stärker abschreckt als die motivierende Ausprägung anzieht. Bezüglich der verschiedenen Routenattribute zeigten der Untergrund, die Steigung und das Verkehrsaufkommen die stärkste Wirkung, sowohl als Motivator als auch als Abschreckung. Ein Schutzstreifen und Ampeln auf der Strecke hatten die geringsten Effekte. Je stärker der Radweg jedoch vom Autoverkehr trennte, desto stärker wirkte er als Motivator, bzw. seine Abwesenheit als Abschreckung. Die Erkenntnisse dieser Studie tragen dazu bei, die Präferenzen von Radfahrern bei der Routenwahl besser zu verstehen und bestehende Radverkehrsinfrastruktur noch weiter zu verbessern.

Habituation of circumnutational response to external stimuli in the garden pea *Pisum sativum*

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In plant-behavior, circumnutation is a well-documented process of circular movement around the main axis of a plant. Circumnutation radius differs between plant-species, but is a nearly ubiquitous behavior found in most species. While the purpose of circumnutation is yet unknown, some more advanced plants, like pea-plants, use this movement for exploration. Furthermore, the speed and radius of the circumnutation is dependent on external factors, reportedly showing a rise as a reaction to stress. Therefore, it might

serve as a physiological parameter for stress and therefore habituation to stress. The garden-pea *Pisum sativum* is a fast growing, active plant with a complex exploration and grasping behavior, in which its circumnutation is especially pronounced. Therefore, it is an ideal plant to observe circumnutational response to stress and if habituation takes place. To investigate this, 30 plants received a repeated aversive mechanical stimulus over the course of ten days, while the speed and amplitude of circumnutation were recorded. A control group was grown under the same conditions, but received the aversive stimulus only before and after the ten days. Compared to the baseline, as well as the control group, increase in circumnutation in the experimental group after the application of the stimulus became lower and lower, showing habituation to the stimulation. Furthermore, application of a different mechanical stimulus induced a reaction more similar to the first reaction before training, showing differentiation between stimuli. This implies that circumnation might be a valuable parameter for plant stress, and shows habituation in pea-plants.

Hand for a hand – effector-specificity for simultaneous Simon effects

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When using stick-figure manikins holding a colored ball in their hands as stimuli, previous research found evidence for two simultaneously occurring Simon effects, i.e., one based on global stimulus position features with respect to the presentation side of the screen and one based on local stimulus position features with respect to the stick-figure manikin. The present study investigated whether the two Simon effects were modulated by the specificity of the effector operated by the participants, i.e., the hands or feet, when viewing the manikins holding the task-relevant stimulus feature, i.e., a ball, in its arms. It was hypothesized that the compatibility of the effector with the stimulus material (i.e., ball in hand of the manikin and hand responses) would modulate the size of the observed global and local Simon effects. Participants performed the Simon task with the stick-figure manikins responding with their hands or their feet. Results showed that the global Simon effect was smaller when responding with the hands compared to the responses with the feet. However, the size of the local Simon effect was not affected by the effector specificity.

Hand position in action imagery of typing

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In action imagery (AI), the body position and therefore actual proprioceptive information about the own body may diverge to different degrees from imagined the imagined body position and therefore imagined proprioception. It is assumed that AI is more difficult with larger discrepancies in actual and imagined body position. In three experiments, we investigated the role of the hand position during imagined typing and analyzed typing

durations and attentional focus. In all experiments, participants performed an execution condition, an imagination condition in which the hands were lying flat next to the right and left side keyboard, and a second imagination condition. In the second imagination condition, the hands were either next to the keyboard with clenched fists (Experiment 1), lying flat on the right and left side of the screen (Experiment 2), or on the back of the participant (Experiment 3). Concerning durations, no significant differences between conditions were observed in Experiment 1. However, in Experiment 2, imagination with hands on the sides of screen was significantly shorter than execution, and in Experiment 3, imagination with hands on participant's back was significantly longer than imagination with hands next to the keyboard. In all experiments, systematic differences between conditions were observed in attentional focus. For instance, participants paid more attention to the movement of fingers in most imagination conditions than in execution conditions. In conclusion, the data provide evidence that incongruence between proprioception/ actual body position and imagined proprioception/ imagined body position changes the content of AI.

Having the same biological sex as an avatar can inhibit performance: Evidence from a level 1 visual perspective taking task

Christine Blech, Hanna Lembcke, & Roman Liepelt
University of Hagen

One implicit assumption underlying the use of digital avatars is that human-avatar-interaction mimics human-human-interaction, especially when similarity between human and avatar is high. Using a level 1 visual perspective taking task (Samson et al., 2010) in an online experiment (N = 101; M_{age} = 33.44 years, SD = 12.31 years), we investigated the hypothesis that due to higher similarity having the same biological sex as an avatar impedes self-other-distinction, manifesting itself in prolonged reaction times for perspective-inconsistent trials under the self-perspective. The design was manipulated within subjects: 2 (avatar's sex: congruent vs. incongruent with participant's sex) x 2 (human's and avatar's perspective: consistent vs. inconsistent) x 2 (task: apply the avatar perspective vs. self-perspective). The expected two-way interaction between consistency of perspective and sex congruency was not confirmed. Instead, under the self-perspective task, the reaction times were generally higher for sex incongruency. Applying an intentional weighing approach (Memelink & Hommel, 2013), we suggest that in level 1 visual perspective taking only one decision-relevant dimension and one inhibitory or facilitative process is activated at a time: The self-perspective, requiring to ignore the avatar, activates self-other-distinction, which in turn is affected by social features like the avatar's sex. In contrast, under the avatar-perspective, irrespective of its physical appearance, only the avatar's gaze direction and its perspective congruency is relevant, serving as an either facilitating or inhibitory attentional cue.

Highlighting the old in the "new normal": Appealing to conservatives' collective nostalgia decreases opposition to COVID-19 measures

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Collective adherence to protective measures is crucial to slow the spread of COVID-19. However, an effective public response is impeded by a wide ideological gap: Whereas politically liberals (e.g., Democrats in the US) generally support protective measures, politically conservatives (e.g., Republicans in the US) often oppose them. Here, we propose that conservatives' opposition to COVID-19 measures is rooted in their collective nostalgia for past society. We argue that conservatives experience the pandemic as strong deviation from past society and, thus, resist newly implemented measures. We conducted five studies ($N_{\text{total}} = 3,088$) investigating whether conservatives' opposition arises from their stronger collective nostalgia and whether this insight can be used to reduce opposition. Studies 1 and 2 demonstrate that feelings of collective nostalgia explain part of the relation between conservatism and opposition to protective measures, both in the US and in Germany. Building on this, we argue that conservatives' rejection of protective measures can be weakened by framing these measures as a way to restore the past. We found support for this assumption in two experiments, in which we manipulated the temporal focus (past vs. future) of a pro-measures statement regarding face masks (Study 3) and vaccinations (Study 4). An internal meta-analysis across all experimental studies in this research line showed that the temporal framing effect is significant but small in the context of COVID-19. Study 5 tests possible explanations for the small effect and suggests that strong partisan influence is due to this. This research demonstrates the practical and theoretical importance of differences between liberals' and conservatives' temporal preferences.

Hindsight bias in numerical judgments with non-numerical feedback

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Hindsight bias is the phenomenon that after having received feedback about the correct answer to a question, people often reconstruct their original responses too optimistically–their hindsight responses are biased towards the correct answer. Traditionally, hindsight bias in numeric judgment tasks has been hypothesized to be mainly driven by anchoring processes. Alternatively, hindsight bias could be a by-product of knowledge updating (Hoffrage et al., 2000), such that hindsight judgments feed on a knowledge base that was updated in light of the correct answer. According to this knowledge-updating account, any feedback that leads to knowledge updating should produce hindsight bias, regardless of whether specific numbers (anchors) are presented. To test this prediction, we designed two types of graphical (i.e., non-numerical) feedback expected to contain enough information to update knowledge. In a preregistered experiment, participants first judged the

population of a set of countries. Then they received either no feedback (control group) or information about the actual country population: the specific population numbers (direct feedback), an unnumbered bar chart (bar chart feedback), or a world map where the countries were colored based on their population (world map feedback). Finally, all participants were asked to recall their original judgments (hindsight task). Supporting the knowledge-updating account, hindsight bias emerged not only in the direct feedback group but also in the bar chart group. There was no hindsight bias in the world map group or the control group. These results support the thesis that knowledge updating contributes to hindsight bias, as it was induced in the absence of numerical information – and anchoring processes thus could not operate.

Hindsight bias: Robust and reliable?

Julia Groß, Edgar Erdfelder, & Rüdiger Pohl
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Experimental tasks that produce robust and replicable effects can have poor psychometric properties and might thus not be suited to investigate individual differences—a finding that has been termed the "reliability paradox". The paradox is well documented for measures of attention, self-regulation, and implicit attitudes. The goal of our study was to investigate the reliability of measures of hindsight bias, a robust memory distortion. In the hindsight-bias paradigm, participants are asked to provide numerical estimates for a series of difficult items (e.g., historical dates, heights of towers, country populations), then learn about the correct answers for some or all of the items, and then recall their initial estimates. To obtain a hindsight-bias score of a participant, one subtracts the shift of recalled estimates towards the correct answer for control items (i.e., without feedback) from the shift of recalled estimates towards the correct answer for experimental items (i.e., with feedback). Positive scores indicate the presence of hindsight bias. We estimated Spearman-Brown corrected split-half reliabilities of hindsight-bias scores for 25 data sets from 13 published and unpublished studies on hindsight bias across different populations and knowledge domains. Reliability coefficients ranged considerably from poor ($< .25$) to satisfactory ($>.75$), with more satisfactory coefficients observed for datasets with heterogeneous (as opposed to homogeneous) participants, fixed (as opposed to varying) item sets, and items from multiple knowledge domains (as opposed to a single domain). We infer that for research on hindsight bias, an integration between experimental and correlational disciplines is possible, given careful consideration of relevant design aspects.

How altered virtual embodiment influence self-perception and cognitive processes

Bigna Lenggenhager
University of Zurich

Virtual reality might be a powerful tool to investigate the link between perception, cognition and action by enabling the systematic presentation and manipulation of multisensory

stimulation and by facilitating the measurement of various physiological and behavioural parameters. In my talk I will present a series of studies, in which we investigated the Proteus effect (i.e., the adaptation of perceptual, cognitive and behavioural processes to a virtual avatar) and its link to the subjective sense of embodiment. It has been shown that the sense of our bodily self is surprisingly plastic. Using immersive virtual reality and synchronous multisensory stimulation we induced a temporarily sense of embodiment of an avatar that differs for in terms of gender, physical strength or associated objectification. We then invested how such altered sense of embodiment influence implicit and explicit measures of self-perception as well as affective and cognitive processes such as social decision making or self-esteem. The results will be discussed with regard to current theories of embodiment as well as with regard to the development of potential educational and therapeutical applications.

How animacy and literacy affect picture naming

Judith Schlenter & Martina Penke
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Studies on sentence processing reliably show a preference to place animate entities before inanimate entities. In our study, we investigated whether this preference holds for picture naming too. Additionally, we investigated in how far the directionality of the script influences the order of production. For this, we systematically manipulated the position of the animate noun in a picture naming task (left vs. right) that included 30 animate-inanimate noun pairs and compared two groups of adult speakers with each other: a group of German speakers ($n = 24$), who named the pictures in German (left-to-right script), and a group of Arabic speakers ($n = 25$), who named the pictures in Arabic (right-to-left script). To examine whether a possible spatial bias results from the reading/writing directionality, we further tested a group of 4-to-5-year-old German-speaking children who were not yet literate (preliminary data from 10 children). A comparison between the adult groups revealed that the Arabic speakers were less likely to name the left picture first than the German speakers. Critically, the order of production was not influenced by the position of the animate noun. Visual inspection of the graphs for the non-literate children suggests that children's order of production was influenced by animacy. Our findings demonstrate that German-speaking adults display a strong preference to name pictures from left-to-right in accordance with their reading/writing habits. First data obtained from a group of preschool children indicate that this preference develops and that effects of animacy in adults possibly have been overwritten by effects of literacy.

How can interaction in a shared environment replace communication for optimal decision-making?

Pavel Voinov
Central European University

One of the most fundamental laws in human decision-making is that people are reluctant to weigh someone else's opinion more than their own (Deutsch & Gerard, 1955). This be-

havior is detrimental in a situation of competence asymmetry, when another's judgment is more reliable than one's own. According to some theories (e.g., Bahrami et al. 2010), verbal communication is the ultimate interactive mechanism which allows people to optimally integrate individual judgments, giving proper weight to a more credible source. In our study we investigated whether non-verbal interaction in a shared environment can be as efficient. Participants in pairs performed a localization task in a virtual 3D environment, where the goal was to make projections from an upper plane to the target on the bottom plane. Projections were inaccurate on the depth dimension, and very accurate along the left-right axis. Partners were provided with complementary viewpoints and could be optimal if each took over one orthogonal dimension. In the Independent condition partners saw each other's individual judgments and could rely on them. In the Agreement condition they provided a joint response. In both conditions communication was not allowed. We found that participants could optimally distribute the dimensions, but only when agreement was mandated. Without the agreement requirement, participants failed to properly rely on their partner on the dimension where the latter were more accurate. Our results demonstrate that even in absence of verbal communication, interacting in a shared environment can result in optimal integration of perceptual information under the condition that an agreement is reached, challenging the previous view that verbal communication is a necessary factor for optimal decision-making.

How different types of cognitive control demands impact subsequent memory

Michèle Muhmenthaler & Beat Meier
University of Bern

In a series of experiments we investigated how different types of cognitive control demands modulate subsequent memory. At study, participants had to switch between two classification tasks and later, free recall performance was assessed. The stimuli consisted of two interleaved words, one word had to be categorized and the other word had to be ignored. The congruency between target and ignored words was manipulated by changing the distractor category. Our results showed that task switching consistently impaired subsequent memory. Moreover, the co-activation of a target and a distractor word that required a different response enhanced later memory performance. Together, our research demonstrates that attention allocation at study is crucial for later memory. Task switching reduces top-down attention toward the targets and results in lower memory performance. Processing response incongruent stimuli enhances top-down attention toward the targets and results in better memory performance.

How do agent type, responsiveness, and response time affect the acceptance and perceived performance of chat agents?

Stefanie Klein & Sonja Utz
Knowledge Media Research Center (IWM)

Organizations increasingly use online chats to provide customer service and to commu-

nicate with their consumers. With the rapid development of artificial intelligence-based technologies and resulting efficiency gains, more and more organizations are considering replacing or supporting human chat agents with text-based conversational agents, so-called chatbots. Therefore, it is crucial to examine if users perceive chatting with a chatbot differently from chatting with a human agent and if they prefer one agent over the other. Conversational features like the use of backchannel cues by the agent signal responsiveness and thus may raise the agent's acceptance among users. In addition, the time it takes the agent to respond to a user's input might play a central role in the agent's perception and overall satisfaction. Using a study advising scenario, we conducted three preregistered online vignette experiments ($N_{\text{total}} = 1{,}005$). We systematically investigated the influences of agent type, responsive communicative behavior, and response time on seven facets of acceptance of chat interactions and the perceived performance of chat agents. Our overall results indicate mixed findings on the impact of agent type on the outcome variables. Responsive conversational cues positively affected likeability and warmth perceptions as well as the overall satisfaction with the interaction. Moreover, we found that social presence and feeling heard mediated the responsiveness effects on perceived warmth and satisfaction. Our findings have practical implications for organizations considering designing and using conversational agents for customer service.

How do co-actors integrate the costs of different types of actions in joint action planning?

Georgina Török
Max Planck Institute for Human Development

People often facilitate their co-actors' actions in cooperation. They may select actions that reduce the effort that the co-actor would have to expend when completing their part of a sequential task. Such facilitation can be part of a co-efficient planning strategy that reduces the collective efforts of acting. The present study addressed how people plan joint actions composed of different types of individual actions. First, we hypothesized that in an individual setting, people will make decisions that minimize the time spent on acting. Second, we hypothesized that to the extent that actors make efficient choices in an individual setting, they will also consider the potential costs of multiple action possibilities available to their partner when planning joint actions. Participants collected objects first on their own in an individual 2AFC task, and then object pairs with a partner in a joint task. They always chose between two means of object collection: tapping and dragging on a touchscreen. To act efficiently, actors needed to compare the relative costs of the available action options. We analyzed object choices. Our hypothesis on choices in individual settings was confirmed: people tried to minimize a common currency behind actions, likely movement duration. We also found support for the co-efficiency hypothesis: choices in the joint object collection task were best predicted by a model that minimized both the decision-maker's and the co-actor's relative action costs. Interestingly, choices were better predicted by a model that used the egocentrically estimated action costs of a partner, rather than the partners' own relative costs. When people integrate a co-actor's action costs into co-efficient planning, they may do so based on their own judged relative costs.

How do perceived competencies affect privacy concerns towards conversational AIs?

Miriam Gieselmann & Kai Sassenberg
Knowledge Media Research Center (IWM)

Conversational AIs (such as Google Assistant or Amazon Alexa) offer their users several benefits (e.g., assistance in everyday tasks, convenience, etc.) and are becoming more and more widespread. Nevertheless, their usage is also associated with privacy concerns. Previous research on the antecedents of privacy concerns has focused on trust in the system provider, individual user characteristics, and objective system characteristics. However, it seems likely, that peoples' subjective perceptions of a conversational AI's characteristics might as well contribute to the emergence of privacy concerns. Given that people anthropomorphize technologies, central dimensions of person perception (e.g., competence) might be applied to conversational AIs. Thus, our research adds to the existing literature by investigating how perceptions of (different levels of) human-like competence in a conversational AI affect peoples' privacy concerns regarding the usage of the system. In an experimental study ($N = 253$) as well as in two survey-based studies ($N_{\text{total}} = 716$), higher perceived competencies on the level of meta-cognitive heuristics (i.e., competencies to derive abstract strategies for task completion based on previous events) were linked to higher privacy concerns regarding the usage of conversational AIs. Findings indicate that not all competencies are necessarily seen as purely positive and that it can be informative to differentiate different levels of competence in the perception of technologies in order to understand people's technology acceptance in terms of privacy concerns.

How do we understand others and how should we model AI interaction partners?

Albert Newen
Ruhr University Bochum

How do we understand others? According to the person model theory of understanding others (Newen 2015, open mind.net), we rely on person models, situation models and a self-model. This enables us to account for 1. the social roles and the individuality of the other person (person models), 2. to register the relevant situation the person is in (situation model) and to relate both to relevant aspects of oneself (self-model). Furthermore, this enables us to develop a social understanding on three levels, namely 1) online understanding of others realized as coordinated interaction in a type of situation, 2) understanding of others as rule-followers (e.g. according to group models indicating typical social roles) and 3) understanding of others as having an individual mindset of attitudes (relying on person models of individuals). Can we use these characteristics to evaluate existing robots as interaction partners and can this help us to describe demands to improve artificial interaction partners? The aim of the talk is to deliver a positive answer. Most robots are shaped to be sensitive to only one type of signal about the human interaction partner. Then there is an endeavor for shaping robots in the direction of acting according to situation models. But there is still a big gap since robots

so far do not include person models neither for groups of persons nor for individuals. Advanced social interaction needs to include such models because our social competence is intensely shaped by knowing with whom we are interacting. Then our behavior in the same situation is adjusted to the interaction partner. This is one central challenge for social robotics.

How does attention influence the effects of color categories

Aimee Martin & Karl R. Gegenfurtner
Giessen University

Color is a prime example of categorical perception. Previous studies have shown that color discrimination is usually faster and more accurate across color categories (e.g., blue vs green), compared to discrimination of colors from the same category (e.g., shades of blue). Whether attention may be driving this perceptual categorical effect is unclear. Within attention, feature based accounts have demonstrated that only colors that match a pre-defined target capture attention, however few studies have investigated the role of color categories. We investigated whether these attention effects depend on color categories, or whether they are driven by color similarity alone (i.e., distance in color space). In a spatial cueing task, participants searched for either a blue or green singleton target interleaved across blocks. Colors were presented in DKL color space. Prior to the target display, cues unpredictive of the target location were briefly shown, this contained a singleton cue that varied in different hues of blue to green. At the end of the experiment, participants were shown color patches of the hues used and asked to rate the hues used as 'green' or 'blue' and to give a rating on their confidence from 1 to 5 (i.e., 1 = guessing, 5 = highly confident) to measure the blue-green border of the hues used for this sample. Our results showed validity effects (e.g., RTs were quicker on valid trials compared to invalid trials) only when cues were from the same category as the target (e.g., blue cues for the blue target; green cues for the green target), with no observed validity effects once cue color crossed into the next category. Overall, these results suggest that attention contributes to categorical effects for blue and green colors.

How expectation influences distribution perception

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Julius Maximilian University of Würzburg

Numerical Information about our world does not only come in the form of single numerical values but often consists of a multitude of values and how these values relate to one another, for example in the form of income or age distributions. Understanding complex topics requires the perception and processing of this distribution information, however people's distribution perception is often far from accurate with related consequences for decision making. Our research therefore targets the cognitive processes underlying the perception of distributions. Since prior expectations about a subject have an influence in other areas of perception we expected prior expectations to also impact distribution perception and the present studies aimed at confirming this assumption. Over the course

of several laboratory and online studies, we presented subjects with different fictitious distributions in the form of profiles which included numerical variables like age or income. After the presentation we asked subjects to estimate the mean value of the four quarters of the distribution (e.g., the poorest 25%, second-poorest 25%, and so on). We manipulated prior expectations about the statistical skew of the presented distributions to examine if these expectations would lead to different distribution perceptions. Statistical analysis showed that expectations indeed had a significant influence on error rates and perceived distribution skew, albeit with some limitations which will be discussed. Overall our findings suggest that expectation is a relevant factor in distribution perception and should receive more attention, especially in contexts where an incorrect perception of distributions might lead to serious consequences.

How flexible is temporal cognition? Concepts of time in Aymara-Spanish language environments

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Spatial concepts of time seem to vary across cultures and languages. The Aymara language spoken in the Andean highlands of South America shows a unique conceptualization of time: It is the only language known so far whose speakers represent the past as lying ahead and the future as being behind. In addition, Aymara speakers seem to organize sequences of events in a cyclic, counterclockwise fashion. The present study aims to replicate these preferences of temporal concepts for Aymara-Spanish bilingual speakers in the Bolivian Andes and to investigate to what extent temporal representations transfer from an Aymaran to a Spanish language environment. Thus, we assessed the temporal concepts of 423 Aymara-Spanish bilinguals while manipulating the linguistic context (Aymara vs. Spanish). At the same time, we controlled for self-rated language dominance using the Bilingual Language Profile. Materials included a dynamic and a static temporal referencing task as well as a non-linguistic sequence-arrangement task. For dynamic and static temporal references, a significant main effect of linguistic context was observed: In Aymara, the expected "front-past" association was most frequent while responses in the Spanish language context replicated previous results and showed larger variability of temporal references that in part depended on the specific Spanish expressions used. In the sequence-arrangement task, cyclic arrangements were chosen most frequently in both language contexts. However, the succession of language environments influenced whether subjects were more likely to choose linear or cyclic arrangements. Overall, our results suggest temporal cognition to depend on the linguistic context and the type of stimuli and tasks while language dominance barely influenced the results.

How the pandemic changes social distancing norms

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The COVID-19 pandemic has fostered ubiquitous compliance with measures such as wear-

ing face masks and maintaining enlarged distances to others. We have studied the effects of mask wearing and distancing rules on interpersonal distance (IPD) preferences in Germany. In Study 1, subjects approached a mannequin and stopped when they deemed the IPD comfortable and appropriate for a conversation with a stranger. Preferred IPD changed little as a function of own mask wearing, but was significantly reduced when the mannequin wore a mask. In Study 2, we examined the IPD preferences of a cohort of subjects in a longitudinal online survey before (2019) and after (2020) the first wave of the pandemic. Subjects' IPD preference before the pandemic largely resembled IPD from previous behavioral studies. IPD during the pandemic was considerably enlarged and exceeded the minimum distance requirement of 1.5 m. At the end of the survey period, our participants indicated that they would continue to prefer an increased IPD of 1.5m and more after the pandemic. Thus physical distancing and mask wearing appear to induce lasting change of behavioral norms in social interaction. We discuss our results in light of proxemics and implications for the design of public spaces.

How to communicate with pedestrians: Exploration of the interplay of dynamic HMI and external HMI for different sized automated vehicles

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This study deals with the interplay of an external HMI to transmit explicit communication signals via 360° LED light-band and a dynamic HMI to transmit implicit communication signals via vehicle dynamics. Previous results on the interplay of dHMI and eHMI indicated that pedestrians tended to rely on the explicit communication via eHMI to indicate their willingness to cross. Nevertheless, this was investigated in a traffic scenario in which the automated vehicles approached from the left-hand side and the traffic rule "left before right" might have affected pedestrian's willingness. To rule this out, pre-recorded video sequences were shown in which the automated vehicles approached from the right-hand side. This study is work-in-progress and the data-collection is still ongoing. Results and further implications for future studies will be discussed.

How to extend the attentional blink: Effects of working memory updating and load

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The attentional blink is a phenomenon of temporal attention, showing that we can temporarily be blind for stimuli following a task-relevant stimulus. We and others have shown that working memory encoding is critical in eliciting the attentional blink. Here we investigate how working memory load and working memory updating affect the attentional blink. In Experiment 1 the task was to report the first and last letter of an RSVP stream. Targets T1 and T2 were embedded either in a stream of digits, or in a stream that began and ended with digits, but temporarily switched to letters between T1 and

T2, requiring permanent working memory updating in order to store the last letter. The digit stream produced the classic attentional blink, whereas the switched stream led to an extended and strong attentional blink that never recovered. Thus, working memory encoding and updating are critical components of the attentional blink. In Experiment 2 we studied the effects of working memory load on the attentional blink. Subjects had to identify two letters in a stream of digits, and store the last distractor digit for later report. Thus we effectively combined the attentional blink and the OSPAN task, using memory loads of 0 to 4 items. Target detection performance was reduced with higher memory loads, but the effect was purely additive and did not affect the attentional blink. Taken together, working memory encoding and updating, but not working memory load affect the attentional blink.

How to respond to an islamist terror attack – an experimental study on crisis response strategies of Muslim associations

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Fear, anxiety and concern about death – all these are thoughts and feelings that a terrorist attack triggers in us (Saad, 2001). A survey by IPSOS has shown that 81% of Germans consider a terrorist attack to be a real danger (Bricker, 2018). Terrorism is usually associated with radical Islamic fundamentalism (Arciszewski et al. 2010). Consequently, Muslim communities became the targets of increased hostility (Allen & Nielsen, 2002). Anxiety leads to a narrowing of our focus and can thus be the basis for the emergence of prejudices. Communication after a crisis is essential to get out of this negative spiral. In a business context, if the crisis response strategy match the crisis type in terms of responsibility attribution, it will lead to a more positive reputation of the organization (Coombs & Holladay, 1996). However, the question remains, how should a terrorist attack with an Islamist background be dealt with by Muslim associations in order to prevent negative prejudices against Muslims? Across three online experiments (total $N = 1{,}672$), we tested the effect of crisis response strategies by Coombs (2007) and one other factor in a fully crossed 4 (response strategies: denial, diminish, rebuild, bolstering) $\times$ 2 (message framing: emotional vs. rational/reputation before the crisis: with vs. without/source: newspaper vs. Muslim organization) between-subjects factorial design. We examine how situational crisis theory reaction patterns crossed with framing of the response, reputation of the Muslim association, and source following a terrorist attack might affect perceived threat and majority prejudice toward the Muslim population living in Germany.

I did it my (path)way – merging pathways into areas while interacting with a randomly behaving partner

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The research of spatial cognition encompasses many approaches, pathways in (virtual) mazes, places in arrays, random object movements, to mention just a few. The current

study investigates whether areas become composed when players have the opportunity to create their own playing field by coloring in places in a grid, taking turns with the system (machine). While the machine could only randomly color-in places, we assessed the strategies of the human players. A first study with 22 adults, 55 children, and 77 machine opponents showed that all players showed the same type of clustering places, with one unique cluster being the largest and many smaller ones. Humans were building a bigger large cluster than the machine, but tinier smaller clusters and explored less. Adults were building longer sequences of consecutive adjacent places than children, but both built longer sequences than the machine opponent. In children and adults, sequence length was correlated with the three largest clusters, while spatial exploration was correlated with all types of clusters. The machine showed only systematic correlations in the larger adult array. For the machine, array exploration was more important in relation to the largest area than sequence length. A second study with 261 human adults and 261 machine partners varied the task instruction in order to test whether the size of the largest cluster could be systematically manipulated. When instructed to build an area, adults built a bigger largest cluster than the control group without instruction, but the group set under time pressure colored-in places faster and took time to build only a smaller largest cluster. Thus, children and adults created pathways to build an area with a unique human strategy which may have action-based origins.

Icy road ahead – gaze during perturbed walking

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Most humans can walk effortlessly across uniform terrain without paying much attention. Natural terrain, however, is rarely uniform, and traversing it safely typically requires visual information. Thanks to mobile eye tracking technology, we can study how terrain affects gaze and thus the sampling of visual information. However, real-world studies offer little control over the terrain, and collecting high-quality motion-tracking data is still a challenge. Most laboratory setups, on the other hand, are far from natural settings for walking. In a setup with a dual-belt treadmill, 240° projection screen, floor projection, three-dimensional optical motion tracking, and mobile eye tracking, we investigated eye, head, and body movements during perturbed and unperturbed walking in a controlled yet naturalistic environment. In two experiments ($N = 22$ each), we simulated terrain difficulty by repeatedly inducing slipping through accelerating either of the two belts rapidly and unpredictably (experiment 1) or sometimes following visual cues (experiment 2). We show that while motor perturbations influenced mainly head movements, eye movements depended primarily on the presence or absence of visual cues. This was true both of immediate slip responses, and – to a lesser extent – over the course of entire 5-minute blocks. Gaze parameters were adjusted already after the first perturbation in each block, with little transfer between blocks. In conclusion, we report gaze-gait interactions in experimentally perturbed naturalistic walking that are adaptive, flexible, and effector-specific.

Identifying information search patterns in risky choice

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It is commonly assumed that people employ a range of different strategies for making decisions, including both simple heuristics and more complex strategies. Because these strategies differ in terms of which and how much information they rely on, their use might also be reflected in patterns in predecisional information search. But what are these strategies? And how variable is strategy use? Here we present a bottom-up approach to address these questions based on analyzing predecisional information search as a manifestation of the latent decision strategies. Using data from a process-tracing study with Mouselab, we used cluster analysis to identify patterns of information search in risky choice. The analysis yielded two clusters: One cluster ("balanced cluster") was characterized by a balanced inspection of both outcome and probability information with most transitions occurring between outcomes and probabilities within the same option. The other cluster ("outcome-priority cluster") showed a focus on inspecting outcome information and on transitions between different outcomes. The two clusters were associated with different choice behaviors; in addition, the choices associated with the balanced cluster were more consistent with the choice predictions of more complex strategies (e.g., least-likely), whereas the choices associated with the outcome-priority cluster were more consistent with the choice predictions of simpler strategies (e.g., maximax). Finally, variability in search seemed to be more strongly driven by individual differences between decision makers rather than by features of the choice problems. Our approach provides a bottom-up approach for investigating cognitive processes in risky choice and constraints current theorizing on the underlying strategies.

"If I said so, then it must be true": Manipulating the implicit endorsement of views on aging within the choice-blindness paradigm (CBP)

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This study investigated how the cognitive accessibility of arguments and beliefs that support different normative aging-related expectations (active ageing vs. disengagement) influences older individuals' attitudes towards norm violators as well as their implicit endorsement of such norms. We expected a matching effect, that is, individuals who had to generate arguments in favor of a specific age norm should evaluate older adults who violate such norm more negatively and should implicitly endorse this norm more strongly. Our sample comprised 131 older adults aged 60 to 84 years ($M_{\text{age}} = 68.64$). Accessibility of supportive arguments for age norms of active ageing versus disengagement was manipulated using the choice blindness paradigm (CBP). To assess attitudes towards norm violators, participants had to evaluate older protagonists who violated either the disengagement or activation norm. Implicit endorsement of age norms was assessed with the Propositional Evaluation Paradigm (PEP) in which probe words ("true", "false")

are presented after reading sentence primes reflecting either activation of disengagement norms. Implicit endorsement of age norms is indicated by responding faster to "true" compared to "false" probes after the respective normative sentence. Results indicated (a) more negative attitudes toward norm violators who violated the primed norm, and (b) stronger implicit endorsement of primed age norms. Our findings suggest that increasing the cognitive accessibility of age norms leads to an internalization of these norms among older people.

Illusions of knowledge

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When judging the truth of a given statement, people use repetition as a cue and judge statements that they have previously seen as more believable than novel statements. This truth-by-repetition effect has been widely researched and is well established. Yet, repetition has further effects on the statements rated. In our research, we found that participants were more likely to indicate that they knew a given statement before participating in the experiment when it was repeated. We sought to replicate this effect in an adapted truth-effect paradigm: Participants first saw randomly sampled statements in a presentation phase. In the subsequent judgment phase, participants again saw the previously shown statements, as well as an equal number of new statements. However, instead of asking for a true/false judgment, we asked participants for each statement whether they knew it prior to participating in the experiment. We successfully replicated the "illusion of knowledge" effect: Participants indicate previous knowledge of a statement more often for repeated statements than for novel statements. We discuss our findings and the potential consequences for false source memories.

Implementation of an online imitation inhibition task

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Imitation is an important social construct: People do imitate a wide range of different behaviors, including language (e.g. Capella & Penalp, 1981), gestures (e.g. Bernieri, 1988) and simple movements (e.g. Genschow et al., 2013). One of the most commonly used measurement methods in this context is the imitation-inhibition task (Brass et al., 2000). Like all other measurements of imitation, this task has only been carried out in the laboratory so far—a time-consuming and costly procedure. To solve this issue and to offer an imitation procedure for online settings, we validated a javascript-based imitation-inhibition task within three studies. In Study 1 ($N = 87$), we tested the functionality of the online task. In Study 2 ($N = 180$), we compared the effects and reliability of the online task with those of a laboratory study. Reaction times and the error rates were recorded as dependent variables. In study 3 ($N = 106$), we controlled for spatial compatibility to show that imitative compatibility is not confounded with spatial compatibility in the task. Across both studies, we replicated the typical imitation-inhibition effects: congruency

effect (individuals responded faster and with fewer errors to congruent than to incongruent trials), facilitation effect (individuals responded faster in congruent than neutral trials) and interference effect (individuals responded faster in neutral than incongruent trials). Compared to the laboratory sample the effects produced with the online measure were similar in size and reliability. In addition, we could show that imitative compatibility is independent of spatial compatibility in the online task as well. Thus, the online imitation-inhibition task provides a well-functioning alternative to its laboratory version.

Impression formation based on the face is affected by the age of a person's voice

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In natural contexts, person perception is multi-modal, with information from the face and voice being rapidly integrated to form a unified representation of the person in question (Young et al., 2020). Although many socially important aspects of a person can be inferred reliably from either modality, one modality may be used preferentially when both are available (Mileva et al., 2018). In order to tease apart differential contributions of faces and voices to first impression formation based on an individual's age, we combined photos of middle-aged faces (ca. 40 - 50 years of age; Ebner et al., 2010) with voices (Zäske et al., 2019) that were either younger or older than the faces (ca. 20 vs. > 65 years old). Participants were asked to rate each person for trustworthiness, attractiveness, and dominance, and, in a final block, to guess the person's age. Two experiments differed only with regard to the age of the participants themselves: Experiment 1 tested 27 students ($M = 22$ years old); Experiment 2 tested 29 senior citizens ($M = 75$ years). The students rated faces combined with younger voices as more attractive than the same faces combined with older voices; for senior raters, voice age did not affect attractiveness ratings. For dominance ratings, the pattern reversed: Students experienced faces combined with older voices as more dominant, senior raters found faces with younger voices more dominant. Trustworthiness ratings were not affected by voice age or participant age. Age guesses tended to be close to the actual age of the face. Interestingly, despite age differences of roughly ± 20 years between faces and voices, only very few face-voice pairings were experienced as strange or mismatching, which is an important finding with regard to multimodal integration.

Impression formation from self-truncated sampling on social groups

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The condition that judging individuals themselves can decide whether to stop a sequentially unfolding information sample or to seek further evidence might constitute a sufficient condition to classical inter-group phenomena, namely out-group homogeneity and out-group polarization/derogation. Typically, social out-groups (i.e., groups we are not

part of) are perceived to be more homogenous in themselves, as compared to in-groups (i.e., groups we are part of; Linville, Fischer, & Salovey, 1989; Quattrone & Jones, 1980). We create a simplified inter-group sampling context by providing participants with a sequence of traits, characterising each a member of the current target group. Participants can decide for themselves when to stop this sequence of information. We predicted and regularly observed that early-truncated samples result in higher perceived within-group homogeneity and more polarized impression judgements compared to samples that were further expanded. Sample truncation and judgements are, however, not exclusively determined by the sample input alone, but moderated by properties and instances of cognitive processing in the mind of the judging individual. We propose a series of diagnosticity factors impacting how the incoming information is weighted and considered. Extreme and negative valence, but also properties of multi-dimensional density regularly impact sample truncation (i.e., sample size), judgement extremity/strength and perceived group homogeneity.

In cooperation we trust! How the possibility to cooperate enhances trust in automated driving

Luisa Katharina Heinrich, Jürgen Pichen, & Martin Baumann
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Availability of highly automated driving is just a matter of years, but whether users trust this technology remains an open question. This work consisted of an online study with $N = 231$ participants (39% female) and investigated what factors influenced drivers' trust in a highly automated vehicle. A $2 \times 2 \times 2$ within-subjects design with the factors cooperation (yes vs. no), automated driving style (conservative vs. dynamic) and mental workload (low vs. high) was employed. Eight videos representing the different conditions were presented to participants. They were instructed to be drivers of an automated vehicle that approached a roundabout. During the cooperative conditions, the planned route was shown to participants and they could change the driving route by cooperating with the system. Participant's manual driving style (adaptive or maladaptive) was determined and could either match or not match with the automated driving style. Multilevel modelling revealed that the possibility to cooperate, a conservative automated driving style, and low mental workload increased trust in the automated system. For a dynamic automated driving style, the positive effect of cooperation on trust was more pronounced and for a maladaptive manual driving style, this effect was less pronounced. The positive effect of a conservative automated driving style on trust was amplified for drivers with an adaptive manual driving style. Overall, results suggest that the possibility to cooperate with the automated system enhances trust in the automated system, especially during initial familiarization.

Incidental learning of person identity: Autonomic arousal to "unrecognized" threat identities

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Remembering both central and peripheral information is important for adaptive future behavior, especially in a potential harmful situation. Therefore, the modulatory effect of contextual threat on defense system activation during face perception and identity recognition was investigated. During an encoding phase, participants viewed face pictures with neutral facial expressions (1s or 6s each) in a context that signaled either threat-of-shock or safety (half of the pictures each), without a learning instruction (incidental). In the recognition phase, all old and additional new faces were presented intermixed without context. Participants had to decide whether a face was new or had previously been presented in a threatening or a safe context. Previous studies showed selective processing of previously seen faces as a function of context (enhanced late central and parieto-occipital negativities to previous threat compared to safe face-context compounds and new faces). Intriguingly, these differential old/new event-related potential effects in EEG were not reflected in conscious recognition performance (poor face/source memory). The follow-up question emerged whether this dissociation between perceptual processing and conscious face recognition is reflected in response priming, and whether participants show autonomic arousal to individuals that were encountered in a threat context but cannot be remembered. These findings are discussed from a clinical perspective as to whether perceptual biases and physiological arousal might be related to threat-associated identity recognition deficits in traumatized and/or socially anxious participants.

Increased accuracy for stimuli near the hands in a cognitively demanding Simon task

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A prominent finding in embodied cognition is that information is processed differently depending on where it is presented in relation to the body. Thus, several effects are moderated depending on whether the stimuli are presented near the hand or further away from the hands. Specifically, Liepelt and Fischer (2016) found that the Simon effect in a cognitively demanding number categorization task depends on the hand position, with a reduced Simon effect when the stimuli are presented near the hands. In contrast, an increased Simon effect near the hands can be observed in less demanding tasks, such as a color classification task. Liepelt and Fischer (2016) argued that this can be explained by a combination of increased cognitive control and increased processing of spatial features. To identify the mechanism behind the effect more clearly, we re-analyzed the data from Liepelt and Fischer (2016) using Drift Diffusion Modelling and Delta Plots. In our modelling we find a higher desired level of accuracy for stimuli presented near the hands. Furthermore, we found some descriptive evidence that the influence of the relevant stimulus features is increased while the influence of the irrelevant stimulus features

is decreased. In addition, the Delta Plots indicate that the time course of the effect is similarly decreasing near the hands and further away from the hands. Overall, these findings are in line with theories predicting that hand-position influences task set configurations prior to stimulus presentation (i,e. proactive rather than retroactive control).

Increasing the predictive power of attitude implicit association tests by introducing the difficulty concept from classical test theory

Merlin Urban, Tobias Koch, & Klaus Rothermund
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We propose a test theoretical approach to tackle the issue of low predictive power of attitude implicit association tests (IATs) by introducing the difficulty concept from classical test theory (CTT). Following CTT, we argue that attitude IATs of medium difficulty (defined as mean IAT scores of zero) have more predictive power than attitude IATs of extreme difficulties (defined as mean IAT scores deviating strongly from zero). This relation between IAT difficulty and predictive power is assumed to be mediated by the variance in IAT scores, with moderate difficulty resulting in more variability. To test our hypotheses, we compared IATs of different difficulties with regard to their ability to predict direct attitude measures, drawing on the Attitudes, Identities, and Individual Differences Study (AIID), a large experimental online study that ran on project implicit. In total 95 different attitude IATs and 127,259 complete cases went into the analyses. In order to account for the hierarchical data structure, we translated our hypotheses into multilevel models and tested them using multilevel structural equation modelling. In line with our hypotheses, IAT difficulty proved to be a powerful moderator of the IATs predictive validity, and the effect of difficulty was mediated by variance. The results suggests that striving for strong and robust IAT effects, i.e. IATs of extreme difficulties, which seems to be common practice in IAT research, actually reduces the predictive power of IATs. We recommend that researchers interested in using the IAT to predict outcomes develop IATs of medium difficulty in order to maximize variability in IAT scores. We also make suggestions how to manipulate IAT difficulty.

Indexing (pseudo)neglect with pupillometry – evidence on the role of the orienting response in pseudoneglect

Christoph Strauch, Christophe Romein, Marnix Naber, Stefan Van der Stigchel, & Antonia F. Ten Brink
Utrecht University

Spatial attention is generally slightly biased leftward ("pseudoneglect"), a phenomenon typically assessed with paper-and-pencil tasks, limited by the requirement of explicit responses and the inability to assess on a sub-second timescale. Furthermore, pseudoneglect is often stable within experiments, but differs vastly between investigations and is sometimes expressed to the left, sometimes to the right. I here describe how we objectively assessed lateralized attention over time, exploiting the phenomenon that changes in the

pupil reflect the allocation of attention in space. Pupil sizes of 41 healthy participants fixating the center were predominantly influenced by the differential background luminance of the left side of the visual display and driven by visual information in the periphery. Differences in pupil sizes positively related with greyscales scores, but not line-bisection. Time-based analyses within trials show strongest effects early on. With increasing trial number, the initial leftward bias shifted central in pupillometry-based and greyscales measures. This suggests that the orienting response determines the size and direction of pseudoneglect, an account which might explain previously thought opposing findings. As an outlook, I will show some preliminary findings on patients with clinical hemispatial neglect, discussing the viability of the here described methods for neuropsychological assessment/diagnosis.

Individual characteristics influence perspective taking in simulated actions — evidence for embodied sentence processing?

Anne Karina Feldmeth
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Theories of embodied language processing argue that understanding language is accomplished by representing the information given in a multimodal situation model. A decisive factor in constructing this mental representation is the perspective a comprehender adopts within this model. However, which factors determine the adopted perspective? One hypothesis is that it is influenced by the ease of identification with the referents of a sentence, modulated by the overlap of referents' characteristics and characteristics of the individual comprehender. In four experiments, I investigated if and how gender as an individual characteristic that is also linguistically represented, modulates identification and the adopted perspective, using the action-sentence compatibility effect (ACE) paradigm. Participants listened to/read sentences, describing directed actions between two referents, e.g., "He/She will give me the book". The task after each sentence required a movement either towards or away from the body. Ease of identification with agent or recipient was operationalized as (mis-)match between gender of participant and either gender of the speakers, or gender-marked 3rd person pronouns. The ACE predicts faster reaction times if hand movement and directed action of a sentence are compatible. If ease of identification influences the adopted perspective within the situation model, the implicit direction of a verb should interact with the match of participant's and referent's gender. In all experiments, results did not reveal a clear effect of verb direction on reaction times (ACE), or an influence of pronoun gender. However, a post-hoc analysis of gender stereotypes of the verbs revealed a more complex pattern of effects, and also sheds light on problematic aspects of the paradigm.

Individual patterns of attentional exploration predict the extent of fear generalization in humans

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Generalization of fear is considered an important mechanism contributing to the etiology and maintenance of anxiety disorders. Although previous studies have identified the importance of stimulus discrimination for fear generalization, it is still unclear to what degree overt attention to relevant stimulus features might mediate its magnitude. To test the prediction that visual preferences for distinguishing stimulus aspects are associated with reduced fear generalization, we developed a set of facial stimuli that was meticulously manipulated such that pairs of faces could either be distinguished by looking into the eyes or into the region around mouth and nose, respectively. These pairs were then employed as CS+ and CS− in a differential fear conditioning paradigm followed by a generalization test with morphs in steps of 20%. Shock expectancy ratings indicated a moderately curved fear generalization gradient that is typical for healthy samples but its shape was altered depending on individual attentional deployment: Subjects who dwelled on the distinguishing stimulus regions faster and for longer periods of time exhibited less fear generalization. Although both, pupil and heart rate responses also showed a generalization gradient with pupil diameter and heart rate deceleration increasing as a function of threat, these responses were not significantly related to patterns of visual exploration. In total, the current results indicate that the extent of explicit fear generalization depends on individual patterns of attentional deployment. Future studies evaluating the efficacy of perceptual trainings that aim to augment 18 stimulus discriminability in order to reduce (over-)generalization seem desirable. Repository: https://osf.io/4gz7f/.

Individual preferences for the cost-balancing strategies in the self-organized task switching

Irina Monno & Andrea Kiesel
University of Freiburg

In voluntary task switching, individuals aim to optimize their performance by balancing cognitive constraints (switch costs) and environmental constraints (waiting time). In the self-organized task switching paradigm, the stimulus associated with a task repetition occurred with stimulus onset asynchrony (SOA), which increased continuously with the number of repetitions until a task switch reset the SOA. Thus, the waiting time for the repetition stimulus increased with the number of successive task repetitions. We examined how individuals balanced switch costs and waiting time in different experimental settings. We observed two different cost-balancing strategies. That is, some individuals switched tasks when the waiting cost was approximately equal to the individual switch cost, i.e., they used the local strategy. Other individuals switched tasks before the waiting cost reached the individual switch cost, i.e., they used the global strategy. Interesting, the preferred strategy was used consistently across different experimental settings, suggesting individual stable costs balancing strategies.

Individual vs. ensemble coding of objects in realistic scenes

Yanina Elise Tena Garcia, Bianca R. Baltaretu, & Katja Fiehler
Giessen University

Being able to interact with objects in our surroundings is dependent upon our ability to spatially encode their locations. Recently, it was shown that the spatial coding of a face differs, depending on whether the face is presented individually or amongst a group of faces (i.e., in an ensemble). Additionally, a related, temporal component was discovered, whereby the contribution of individual or ensemble coding was demonstrated to depend on the allotted encoding time. In this study, we tested whether and how individual and ensemble coding vary with encoding time, and if this generalizes to other classes of stimuli (i.e., objects). Participants viewed a kitchen scene with six randomly distributed objects (fruits and kitchen devices), on a computer screen, at one of three encoding times (0.1s, 0.8s, or 3.2s). After a 0.5s delay, they had to indicate (via mouse click) the centre location of a specified object (Individual condition) or of the six previously presented objects (Ensemble condition) on an empty kitchen scene. When we compared performance for the Individual and Ensemble conditions across encoding time, we found differences only for the shortest encoding time, with better performance for the Ensemble condition. Within each of the coding conditions, encoding time also generally affected performance, with longer encoding times resulting in better performance. Overall, these findings suggest that spatial coding of objects in realistic scenes are differentially influenced by individual vs. ensemble representations, the latter of which can be quickly estimated and used to establish an early performance advantage.

Individuals high in reactive autonomy are more likely to resist bogus feedback on general knowledge questions and on items of Raven's progressive matrices

Elli Zey & Sabine Windmann
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Ever since the famous conformity studies of Solomon Asch, psychological research has demonstrated the phenomenon of behavioral conformity in numerous studies. By contrast, the tendency to resist the influence of social norms and influences, as expressed in the concept of reactive autonomy, has been rather understudied, especially in experimental work. The present preregistered study links self-reported reactive trait autonomy with the resistance to adjust behavioral responses in accordance with the (manipulated) descriptive norm in an experimental task design. The task consisted of 16 general knowledge questions and 10 items of the Raven's Progressive Matrices. After participants gave their initial response, (bogus) feedback on the distribution of responses from other participants was given on a fraction of the trials, upon which participants could rethink and alter their response. In a pilot sample of $N = 62$ participants, we observed that participants did indeed alter their responses significantly more often when the feedback was inconsistent with their initial response compared to consistent feedback. More importantly, self-reported reactive trait-autonomy correlated negatively with the likelihood to

alter the response after inconsistent feedback $r = -.37$, $p < .001$. As expected, response shifts were less likely the more participants reported certainty about their initial decision. Finally, even though self-reported trait-autonomy scores correlated positively with need for cognition scores, the latter did not significantly predict response shifts rates. We aim to replicate these findings with a larger sample to gain further evidence on the personality profiles of those who resist social norm influences in their decision-making.

Information interpretation and synthesis in complex decision-making: Locating performance benefits of small groups

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In complex decisions, such as when making a medical diagnosis, decision makers typically gather information, interpret it, and synthesize it to a final decision. In a previous study, we showed that delegating such complex decisions to collaborating pairs may substantially increase decision quality as compared to individuals. Given the higher costs associated with teamwork (e.g., due to involving more people and time to coordinate), however, it is of great practical interest to understand when in the decision process performance benefits of teams may arise. We thus conducted an experimental study in which 4th-year medical students worked either in pairs ($n = 35$) or alone ($n = 39$) on two separate tasks: (1) on describing and interpreting $N = 17$ diagnostic test results (e.g., ECGs, X-rays) and (2) on synthesizing information of $N = 6$ patients into a diagnosis, respectively. Expert raters coded the quality of information interpretations and diagnoses (0 incorrect, 0.5 partly correct, 1 correct), Cohen's $\kappa > 0.8$. Linear mixed-effects models revealed that interpretations made by pairs were better ($M = 0.45$, $SD = 0.45$) than those made by individuals ($M = 0.38$, $SD = 0.44$), 95% CI [0.03, 0.12], $p = .002$. No differences between pairs ($M = 0.58$, $SD = 0.5$) and individuals ($M = 0.61$, $SD = 0.49$) were observed during information synthesis, $OR = 1.32$, $p = .641$. We conclude that the possibility of team members to correct each other's errors and to make use of a greater knowledge base may particularly pay off during the information interpretation phase but not during mere synthesis. These findings encourage the strategic use of collaboration with a colleague during a single phase of the decision making process.

Input optimization facilitates the acquisition of gender-like subclasses in an artificial language by 4- to 6-year-olds

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The grammatical gender of nouns in German is notoriously hard to acquire. Arguably, there are too few relevant semantic or form cues towards their grammatical gender. Syntactic cues, such as definite articles, are similarly ambiguous due to overlapping markers ("der" can be used with masculine and feminine nouns). Evidence from adult learners suggests that such ambiguity may be reduced when the linguistic input is presented in an optimized fashion, such that combined cues can be perceived more easily by the learners.

We assessed how well preschool children aged 4;6 to 6;6 acquired gender-like noun subclasses in an artificial language, 1) when relevant syntactic cues were presented such that all relevant forms pertaining to one pseudonoun were presented in immediate succession (grouped presentation) as compared to in a random order, and 2) when the input featured definite articles only as syntactic cues towards gender-like subclasses in the input (non-inflected condition) or definite articles plus adjective inflections (inflected condition). In the inflected condition, the syntactic cues were unambiguous but also more complex than in the uninflected condition, which featured fewer, and ambiguous, markers. In six individual sessions, the children trained the artificial language through interactive board games with varying linguistic tasks. Their performance at test suggests that a grouped presentation is an efficient means of input optimization. Adding extra markers hinders the acquisition of gender-like subclasses but this can be compensated by highly noticeable additional markers that direct learner's attention towards paradigm cues. We discuss the implications of our findings for fostering the acquisition of German grammatical gender in preschool children.

Integrating attentional template switching dynamics in visual foraging with TVA

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In recent years, visual foraging tasks in which participants search and collect multiple target types from crowded displays (or "patches") have been used to assess the flexibility with which attentional templates are switched during the search. The feature context of a patch modulates this flexibility. For instance, color-defined targets lead to efficient search and frequent switching, while conjunction targets (defined by combining features) lead to slower foraging and extended same-type selection runs. In earlier work, we developed TVA-based simulations showing how TVA's attentional control mechanics predict fewer visual short-term memory operations (and possibly less effort) when employing run-like selections in conjunction foraging. These simulations included static rules for switching attentional templates (e.g., "if no more targets of type 1 are found, switch to type 2"). Here we extend this work by modeling more realistic implicit template switching dynamics based on inter-target priming and template memory decay. We compare predicted run statistics and parameters of foraging efficiency with data from visual foraging experiments with humans. Moreover, we discuss how TVA can be extended toward more naturalistic paradigms such as visual foraging by modeling the dynamic interactions between environment, attentional control, and visual short-term memory content.

Interleaving as the friend of induction in category concept learning: Evidence for the attention attenuation hypothesis from EEG alpha/beta oscillations

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University of Trier

Interleaving examples from different categories (e.g., paintings by different artists) typically enhances memory for the examples and inductive learning of category concepts compared to massed presentation of the examples from the single categories. In an EEG study, we aimed to investigate how this interleaving effect for inductive learning manifests in EEG oscillatory dynamics. Using a modified version of the paradigm introduced by Kornell and Bjork (2008), the EEG was recorded while participants viewed several paintings by different artists whose artworks were presented in either an interleaved or a massed fashion. Replicating previous findings, the behavioral results showed that spacing increased recognition of the originally studied items and enhanced inductive learning of category concepts, i.e., recognition of whether new exemplars were painted by previously studied artists or by other artists with a similar painting style, in comparison to massed presentation of items. In addition, the EEG results showed that interleaving during encoding was associated with a significant decrease in stimulus-related alpha/beta power over posterior electrode sites compared to the massed presentation of items. The results are consistent with the attention attenuation hypothesis, which posits that spacing exemplars from different categories increases attentional encoding and thus enhances item memory and inductive learning of category concepts.

Interpreting published effect sizes in behavioral science: On the role of the error-theory in evaluating the amount of effect

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Behavioral science publications today typically employ standardized effect size measures that quantify the observed mean difference, $m_1 - m_0$, relative to the observed standard deviation, s. A prime example is Cohen's d-measure: $d = (m_1 - m_0)/s$, or its transformation into the correlation measure $r = d/\sqrt{d^2 + 4}$. Standardized effect size measures are commonly used in behavioral science, e.g., in meta-analytical research to quantify the observed $m_1 - m_0$ across object-level studies that use different measurement-scales, or in theory-construction research to point-specify $m_1 - m_0$ as a theoretically predicted parameter. Since standardization conceptually relates to the quality of measurement, the observed $m_1 - m_0$ can be fully interpreted only relative to the error-theory that determines s. This error-theory, however, must typically be chosen freely today, because a theoretically motivated measurement-scale is normally unavailable. Based on hypothetical yet realistic data, we here show that - given identical mean differences as observations - differentially sophisticated error-theories let the observed $m_1 - m_0$ vary massively, because the amount of effect results from the mean difference $(m_1 - m_0)$, the observed

standard deviation (s), the dependent variable's reliability ($r_{xx'}$), the measurement error (se), the quasi-experimental setting's quality (se^{**}), and from how this setting is standardized. This lets the common praxis of publishing $m_1 - m_0$ "nakedly" – without a transparent error-theory – appear problematic, because the goals of a cumulative science of human behavior are thus undermined. We discuss implications for theory construction, meta-analysis, and generally for evaluating the amount of effect, and advocate that effect sizes be reported along with a transparent error-theory.

Inter-trial variability of context influences the binding structure in a stimulus-response episode

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Several lines of research suggest that stimuli and responses are bound together in a binary fashion into an episodic representation, called event file or stimulus-response episode. However, Mayr et al. (2018) employed a four-alternative negative priming task which required participants to perform a keypress response to a target sound and to ignore a simultaneously presented distractor sound. Interestingly, results showed that a context, that is, a completely task-irrelevant sound, modulated the binary binding between the distractor stimulus and the response, instead of entering into a binary binding with the response itself. The current study investigates the role of inter-trial variability of the context on the binding structure between the context and the response. The study employed the auditory negative priming task previously used by Mayr et al. Participants were either assigned to the high-variability group (with 8 different individual sounds as context) or the low-variability group (with only 2 different individual sounds as context). In the low-variability group, context modulated the binary binding between the distractor stimulus and the response, thereby replicating the previous finding. In the high-variability group, however, the repetition of the context sound per se retrieved the prime response, indicating a binary binding between the context and the response. Together, the current findings provide evidence that the variability property is a determinant of the binding structure involving context information in a stimulus-response episode. Possible underlying mechanisms (i.e., attention and cue overload) are discussed.

Intraindividual variability in affect: A formalized, theoretical approach

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Studying the ebb and flow of affect in daily life provides important insights into psychological functioning and well-being. However, little attention has been paid to the sources and underlying processes of these short-term changes. We propose a model in which affect is conceptualized as the output of dynamic processes. Given that affect reflects transactions between an organism and its proximal environment, we relate the evaluative aspect of events in terms of their pleasantness or unpleasantness (iV, "valence") to fluc-

tuations in momentary affective experience (dV, "affect"). The model explains affective experience as resulting from the cumulative effects of previous valent events ("accumulation principle"). The core of the model consists of parameters that moderate the relation between valent events and affective experience. These parameters reflect individual differences in the extremity of short-term changes (reactivity) and in longer-term changes in affective experience (attenuation) caused by positive or negative events. A simulation study revealed identifiability of the model's core parameters via Bayesian modeling. An empirical application of our model will be presented using daily affect and event ratings from 315 individuals ranging in age between $14 - 86$ years. The general pattern of results suggested age-related improvements. Older adults were less reactive to hassles and regulated hassle impact more strongly than younger adults. Affect elicited by uplifts was more stable for older than younger adults. We discuss potentials and limitations of the approach and close with an outlook on the broader implications for understanding emotional development.

Introducing BRAC: Current research on binding and retrieval

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One of the core ideas of the BRAC (Binding and Retrieval in Action Control) framework is that action control – in a variety of situations - can be explained by two basic mechanisms: Binding and Retrieval. Binding hereby is the mechanism that combines different elements of a stimulus-response episode into an integrated event-file. When one or more of these elements are repeated later on, this leads to a retrieval of the event-file and, thus, influences performance. In this introductory presentation, we will summarize current research on binding and retrieval and present further developments of the BRAC framework. Different research questions will be addressed, such as which factors can influence binding and retrieval - and which cannot. Further, we also discuss temporal aspects of binding and retrieval as well as the interplay of both mechanisms but also their distinct influences on action control. Finally, we would like to speculate on how broadly the BRAC framework can be defined and whether it may be able to account for empirical phenomena in other research areas like learning, memory, and attention.

Investigating face perception during free-viewing in a naturalistic virtual environment

Debora Nolte, Marc Vidal De Palol, & Peter König
Osnabrück University

Face perception is commonly investigated in standardized lab settings with high experimental control during which eye movements are generally restricted and the fixated stimuli are predetermined. While faces are considered prevalent and important stimuli (e.g., Wheatley et al., 2011), little research has explored the perception of faces in naturalistic settings. The current study combines high experimental control with natural viewing and movement behavior by investigating face perception in a virtual environment. Our

virtual city consists of houses, various background stimuli, and notably static and moving pedestrians. Participants freely explore the virtual scene while eye-tracking and EEG data are recorded. Preprocessing and the definition of gaze events was done according to Walter et al. (2021). We investigate participants' distribution, duration, and distance of gaze events on faces and the separation between action-relevant and irrelevant gazes. As expected, preliminary results indicate a smaller distance and, to a lesser extent, shorter gaze events when focusing on faces compared to background stimuli. The findings of this study will provide insights into face perception in a naturalistic virtual environment.

Investigating the genuineness effect: Looking at real works of art vs. reproductions

Eva Specker & Helmut Leder
University of Vienna

As our world becomes more digital, our interactions with art increasingly occur online through reproductions. In the psychological literature, the difference in aesthetic experience between a physical work of art and its (digital) reproduction is referred to as the "genuineness effect". This effect will be the topic of discussion of this talk. Specifically, we will first review a recent meta-analysis (Specker et al., 2021) that essentially found no evidence for this effect. We then discuss why a genuineness effect has not been found so far, and then discuss empirical work that tries to tease apart these reasons. Specker and Leder (under review) focus on the facsimele accommodation hypothesis proposed by Locher et al. (1999, 2001) and Specker, Arato, and Leder (under review) focus on the well-known anchoring effect as a potential confound. As our world becomes more digital, and especially now, in the wake of the Covid-19 pandemic, people often have not been able to engage with physical artworks and all kinds of cultural institutions have been forced to close their doors, and are only accessible virtually, the question of what real artworks contribute to our aesthetic experiences becomes more and more pressing. Therefore, a better understanding of the genuineness effect—or lack thereof—could not only have a far-reaching impact on the role of cultural institutions and art in our society, but also our scientific understanding of how we interact and engage with art as well as our empirical approach to studying these topics. We hope in this talk to take a first step towards furthering our understanding of this topic.

Investigating the impact of response repetition frequencies on n-2 repetition costs

Miriam Gade
Medical School Berlin

Cognitive flexibility as measured in task switching is presumed to rely on activation as well as inhibition processes. Inhibition is reflected in so called n-2 repetition costs that arise from comparing n-2 repetitions such as ABA sequences to n-2 switches, such as CBA sequences. Recently, an episodic retrieval account to explain n-2 repetition costs has been put forward. According to this theoretical account, episodic memory traces of former

performance are automatically retrieved and can interfere with successful completion of current task demands. Our experiment aims testing possible constraints of this episodic memory account. Grange and colleagues (2017) found significantly reduced n-2 repetition costs in case of n-2 response repetition. In the present study, participants take part in a similar rule-switching paradigm, with 50% n-2 rule repetition as well as n-2 rule switches. Additionally, we will manipulate response repetitions on two levels, 25% vs. 50%. If n-2 repetition costs are reliably attributable to episodic memory, no differential impact of response repetition frequency should arise. However, when the reliance on episodic memory is dependent on experimental set up (i.e., saliency of response repetitions), we expect to see differential contribution of episodic memory and inhibition dependent on frequency of response repetitions.

Investigating the impact of visual and auditive task environments on cognitive load using pupillometry

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Pupillometry has proven to be a reliable method to measure cognitive load. Its use, however, remained limited due to its rigidity of data collection and the complexity of data analysis. Our goal was to investigate cognitive load in a memory span task using letters and numbers while using a mobile eye-tracker to make data collection more ecologically valid. In addition, we compared pupillary response differences between visual and auditory presentation of the stimuli. Our initial findings suggest that pupillary responses show less variability in the visual compared to the auditory condition. For both modalities, however, pupillometry proved to vary systematically as a function of load conditions. Furthermore, we showed that there is no difference between material, i.e., similar reaction times and error rates for numbers and letters. We also discuss some challenges collecting and analyzing pupillometric data and some prospects for future research.

Investigating user experience when interacting with technology in safety-critical domains: The example of anesthesiology

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User experience (UX) increasingly became an important topic for the design and evaluation of consumer technology in the last decades. In fast-paced, socio-technical, and safety-critical domains such as plant control or anaesthesiology, research focused on safety, efficiency while user experience has mostly been neglected in the design or evaluation of technology. However, human-computer interaction approaches such as psychological or personal need satisfaction or embodiment in the design of interactive technology may contribute to well-being, contemporary safety management, and better human-machine teaming. In the present contribution, we summarise our (1) questionnaire and design research on applying UX concepts developed for consumer technology in anaesthesiology and (2) qualitative research on understanding specific UX aspects in anaesthesiology. Our

results show that UX approaches for consumer technology do not scale to safety-critical domains to a full extend. For example, psychological needs such as safety should be adapted for these domains to encompass the team aspects. Furthermore, fallback plans or the technology supported cooperative work should be considered in the need relatedness. Our qualitative results from high-fidelity medical simulation studies showed that anaesthesiologists accepted the UX-based interaction design and our preliminary experimental evaluations showed that such a design also resulted in more efficient performance. We further discuss the development of a UX questionnaire that is tailored for the use in safety-critical domains and experimental approaches to study UX in safety-critical domains.

Involuntary evaluation of others' emotional expressions depends on expresser's ethnicity. Further evidence for the social message account by using the extrinsic affective Simon task

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Saarland University

If emotional expressions are presented in tasks that allow for involuntary assessment of valence, typically joy and fear expressions elicit positive and negative evaluations, respectively. If faces of different ethnicities are presented, typically evaluations conform to prejudices (ingroup = positive; outgroup = negative). What happens if faces are characterized by two features (i.e., emotion and ethnicity)? The social message account (SMA) assumes that the features will be integrated: ingroup joy indicates affiliation whereas outgroup joy indicates dominance; ingroup fear is a warning whereas outgroup fear signals submission. Evidence was found in an approach-avoidance task (AAT; Paulus & Wentura, 2014): Ingroup joy and outgroup fear facilitated approach whereas ingroup fear and outgroup joy facilitated avoidance. However, in the evaluative priming task (EPT) – aiming at involuntary evaluation – both features independently triggered priming effects (Paulus & Wentura, 2018). A difference between the tasks was that ATT required direct reactions to faces while in EPT faces served as task-irrelevant primes. Therefore, we examined the evaluation with the Extrinsic Affective Simon Paradigm (EAST; $N = 120$, online). As in AAT, the EAST let participants react to faces directly. We used negative and positive words to load two keys with negative/positive valence, respectively. In other trials, happy and fearful faces of Middle Eastern and White Caucasian males were presented. Using the valent keys, participants had to categorize which side of the face was blurred. The affective meaning was indeed involuntarily processed and it conformed to SMA. That is, ingroup joy and outgroup fear facilitated negative responses whereas ingroup fear and outgroup joy facilitated positive responses.

Irrelevant task-set saliency increases task-selection failures in task switching

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In classic control tasks (e.g. the Flanker task) cognitive conflict is thought to arise whenever the irrelevant, yet salient feature of the stimulus, activates a response which is different from the one required by the relevant feature. Similarly, in task switching it has been argued that presenting stimuli that afford both tasks, leads to the simultaneous activation of the relevant and the irrelevant task-sets (i.e. task conflict). In the present study we investigated whether bottom-up activation of the irrelevant task does play a role in generating task conflict. In particular, we focused on extreme conflict conditions, namely on errors due to task-selection failure. We reasoned that if bottom-up activation of the irrelevant task is the cause for task-selection failures, making the irrelevant stimulus feature more salient would lead to an increased likelihood of selecting the wrong task. Distractor saliency was manipulated by varying the difficulty of the irrelevant task, which could be as difficult as the relevant task (non-salient distractor stimuli), or easier than the relevant task (salient distractor stimuli). In order to estimate the probability of successful task- and response selection for each participant in each condition, we used a hierarchical bayesian implementation of multinomial processing tree models. Our results showed that the probability of selecting the correct task was indeed reduced when the irrelevant task was made salient. Importantly, distractor saliency had no impact on the probability of selecting the correct response. These findings suggest that the bottom-up activation of the irrelevant task is a likely contributor of task-set interference in task switching.

Is Hogarth's line of beauty really the most beautiful?

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In his book 'Analysis of Beauty' from 1753, the British artist William Hogarth introduced his 'Line of Beauty' (LoB) by depicting seven S-shaped lines and declaring #4, which has a certain curvature, as the most beautiful. Even today, the LoB has a persistently strong influence on many areas such as landscape art and design, calligraphy, furniture design, architecture, dance, etc. Therefore, it is all the more astonishing that Hogarth's claim has never been tested empirically. In our study, we made up for it and found that the LoB is indeed the most preferred among Hogarth's seven lines. However, since the LoB also differs from the other lines in several respects, such as thickness, length, etc., it is open whether its preference was due to its specific curvature alone. To investigate the effects of curvature and other properties on aesthetic preference, we conducted further experiments in which these properties were varied systematically. Our results show that preference is nonlinearly related to curvature. Moreover, S-shapes whose lower arc is slightly longer than the upper arc, are preferred. Together, these two properties explain more than 80% of the variance in preference judgments.

Is it advisable to take the intentional stance towards AI-systems?

Tobias Schlicht & Eva Weber-Guskar
Ruhr University Bochum

Technological progress in the development of AI systems that populate our private environment, not only the workplace, call for new theoretical questions, practical challenges and ethical questions to do with social interaction. For a long time now, we have not only been interacting with fellow humans (and non-human animals) but also with chat bots, via smart devices, avatars, even robots. What is the effect of such an increasing presence of AI-systems in our daily lives? Theoretically, can we simply apply our philosophical/psychological theories of human-human social interaction to human-machine social interaction? Or do we have to adjust our assembly of cognitive strategies to make sense of each other? Taking one step back, should we even take the intentional stance towards such robots or tactically retreat to the functional stance? Should we conceive of them as friends, colleagues, slaves, machines? And what are the consequences for the future design of such systems, i.e., even if technologically possible, should we design them such that it is more likely that they invoke the one or the other stance in us? What would be advantages and risks of taking either of these stances towards intelligent AI-systems? This talk will explore some of the dimensions of this topic.

Is it all about the feeling? Affective and (meta-)cognitive mechanisms underlying the truth effect

Annika Stump, Jan Rummel, & Andreas Voss
Heidelberg University

People are more likely to judge repeatedly perceived statements as true. A decisive explanation for this so-called truth effect is that the repeated information can be processed more fluently than new information and that this fluency experience renders the information more familiar and trustworthy. Little is known, however, regarding whether and how affective states and dispositional cognitive preferences influence the truth effect. To this end, we conducted two experiments in which we manipulated (a) processing fluency via repetition, (b) the time interval (10 min vs. 1 week) between repetitions, and (c) short-term affective states using the presentation of emotional faces (Experiment 1) or the presence of an irrelevant source for changes in affective states (Experiment 2). Additionally, we assessed the dispositional variables need for cognitive closure (NCC), preference for deliberation (PD) and preference for intuition (PI). Results of Experiment 1 showed that the truth effect was significantly reduced for statements that were followed by a negative prime, although this was the case only for the longer repetition lag. Furthermore, higher NCC and lower PD scores were associated with an increased truth effect. Results of Experiment 2 replicated the moderating role of NCC and further showed that participants, who were provided with an alternative source for changes in their affective states, showed a reduced truth effect. Together, the findings suggest that (a) fluency-related changes in affective states may be (co-)responsible for the truth effect, (b) the

truth effect is decreased when the repetition interval is long rather than short, and (c) the truth effect is increased for individuals with a higher need for cognitive closure.

Is multi-modal multitasking easier or more difficult than uni-modal multitasking?

Lynn Huestegge & Lisa Weller
Julius Maximilian University of Würzburg

When speaking of "multi-modal" multitasking, most researchers usually refer to multitasking involving different input (perceptual) and/or output (effector) systems. In the present talk, we address the central question of whether multi-modal multitasking is better or worse than uni-modal multitasking. In a series of experiments, we focused on the output side of processing by comparing intra- and inter-modal action control under otherwise controlled conditions. The results indicate an advantage of intra-modal action control, thereby challenging accounts of cognitive architecture that posit seperate resource pools for different effector systems. Our results are instead in line with the assumption that holistic representations of action demands, which can lead to superior performance, are enabled with increasing dimensional overlap (including overlap regarding action modality) across action requirements.

Is test-potentiated learning more effective than how learners usually learn?

Sophia C. Weissgerber & Ralf Rummer
University of Kassel

For test-potentiated learning (TPL) to be justified as recommended strategy in self-regulated learning (SRL), research has to show that TPL is superior to students' individual standard practices (home remedies). We present an experiment with an unregulated control group (learners apply their individual activities like when learning at home), a TPL group without feedback and a TPL group with feedback. An unregulated control group is rarely used, because research questions usually concern the systematic comparison of TPL with certain learning activities (e.g., note-taking, concept mapping). In applied research on SRL one important question which needs to be asked is whether it is justified to recommend learners to change their usual learning behavior. An unregulated control group is also rarely used, because low judgments of learning (JOLs) for TPL are misinterpreted as reflecting learners inaccurate effectivity judgments in favor of rereading and learners are believed to primarily reread materials. Our online experiment ($N = 153$) compared an unregulated control group to TPL with and without feedback when studying an expository text for 15 minutes (without incentives) regarding retention performance after two weeks. While learning results of the unregulated control group equaled TPL without feedback, results were best for TPL with feedback. In the unregulated control group, learners mixed activities, primarily note-taking, rereading, and small dosages of TPL. Learners' JOLs for TLP with feedback were (accurately) higher than for TLP without feedback, but (inaccurately) highest for unregulated learning. Thus,

TLP with feedback (which would be recommended for practice) outperformed learners' individual learning strategy.

Is the Hebb repetition effect an instance of episodic long-term memory acquisition?

Joscha Dutli, Lea M. Bartsch, & Klaus Oberauer
University of Zurich

The Hebb repetition effect refers to the improvement in immediate serial recall performance when the same list is repeated on every third or fourth trial. Performance on randomly created intermediate lists remains constant over time. The effect has been observed to be comparable between younger and older adults (Turcotte, Gagnon, & Poirier, 2005). This is surprising because list memory requires bindings, and age-related episodic memory deficits are driven by a decline in the ability to form and retrieve associative bindings (e.g., Old & Naveh-Benjamin, 2008). The equivalent Hebb effect in young and old adults raises the question whether the Hebb repetition effect relies on the formation and retrieval of episodic memory traces. To investigate this, we presented older and younger adults with lists of word pairs in an immediate cued recognition task testing both item and binding memory. As in the Hebb paradigm, we repeated one list of pairs on every third of thirty trials. Finally, we tested all pairs separately in a subsequent long-term memory test. Our results replicate the finding of comparable Hebb repetition learning in older and younger adults for both item and binding memory, and suggest that older adults are able to overcome the associative binding deficit in long-term memory when learning lists of item-item-bindings in the Hebb paradigm.

Is there an age-related positivity effect in source memory?

Nikoletta Symeonidou, Abdolaziz Hassan, Isabel Porstein, & Beatrice G. Kuhlmann
University of Mannheim

The goal of our research was to investigate whether older adults show enhanced source memory for positive sources, akin to the age-related positivity effect found in item memory. Building on the socioemotional selectivity theory (Carstensen et al., 1999), we predicted that older adults' source memory benefits more from positive compared to negative (and neutral) sources relative to younger adults' source memory. Using neutral words as items superimposed on either a positive, negative, or neutral background picture (matched on arousal) as source and applying incidental learning via word pleasantness ratings, we found a general emotionality effect in source memory for younger ($n_{\text{young}} = 27$, age range $19 - 28$ years, $M = 21.96$, $SD = 2.39$) but not for older adults ($n_{\text{old}} = 25$, age range $= 52 - 73$ years, $M = 63.76$, $SD = 5.99$) and no age-related positivity effect. However, older adults rated words paired with the negative source more pleasant than younger adults, indicating a positivity effect in pleasantness ratings. We are currently planning a second study, in which we will use the same emotional pictures as items versus sources in two separate experimental conditions. If this study reveals that older adults show a positivity effect only in item but not in source memory (for the exact same material),

it would provide strong evidence that the age-related positivity effect is specific to item memory and further support the theoretical distinction of source from item memory.

Is there something you don't tell me? The propositional evaluation paradigm as an indirect measure of self-esteem

Adrian Jusepeitis & Klaus Rothermund
Friedrich Schiller University Jena

Indirect measures of self-esteem are designed to measure global self-evaluations that individuals are unable or unwilling to report. Conventionally, they have been based on the idea of associative representations of self-esteem. In contrast, the Propositional Evaluation Paradigm (PEP; Müller & Rothermund, 2019) assesses propositional evaluations, which allows for a specification of the relation of attitude object and evaluation. I will present a series of three preregistered online studies (total $N = 443$) investigating whether spontaneous truth evaluations of self-evaluative statements measured in a self-esteem PEP (SE-PEP) have incremental validity in predicting self-esteem correlates over and above the Rosenberg Self-Esteem Scale (Rosenberg, 1965). All three studies contained evidence for an incremental predictive validity of the SE-PEP. A pooled analysis of the three studies revealed that SE-PEP effects were incrementally predictive of depressive symptoms and negative affect, supporting the conclusion that spontaneous truth evaluations of self-evaluative statements are informative beyond questionnaire measures. Differences and similarities of the results across the studies are discussed with regard to the procedural details of the SE-PEP in each study.

It takes some time – decay of response-response binding effects during the first twelve seconds after integration

Birte Moeller & Christian Frings
University of Trier

Several influential accounts of human action control assume transient bindings between stimulus- and response features of individual events (SR-binding; e.g., Frings et al., 2020; Hommel et al., 2001; Schmidt et al., 2016). Notably, the duration of bindings seems to increase with the task relevance of the bound features. Recently, we observed relatively long durations of bindings between individually planned and executed responses (RR-binding): In contrast to SR-bindings that typically decay completely within five seconds after integration, we found no measurable decay of RR-bindings within the first six seconds after integration (Moeller & Frings, 2021). Here we aimed to pinpoint a timeframe in that RR-bindings decay. In the presented Experiment ($N = 29$) we measured response-response binding effects between six and twelve seconds after integration and found a duration of RR-binding effects of up to nine seconds. The significance of different durations of binding effects depending on the integrated features for mechanisms in action control is discussed.

Item versus source memory: Dissociations in forgetting patterns

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Although substantial research has provided evidence for the dissociation of item versus source memory by manipulating factors differentially affecting item versus source learning and remembering, differences in patterns of forgetting between these two memory types remain unexplored. Based on a neuropsychological theory of memory-system dependent forgetting (Hardt et al., 2013), dissociated patterns of item versus source forgetting are predicted: Hippocampus-represented source memory should be fairly resistant to shorter-term interference-based forgetting but susceptible to longer-term decay-based forgetting, whereas the reverse should hold for familiarity-based item memory which is not represented in the hippocampus. In an online experiment with $N = 164$ younger adults ($18 - 30$ years, $M = 24.37$), we confirmed both predictions using multinomial modeling to separately measure item versus source memory: There was significant item (object pictures) but not source (their screen location) forgetting over short (~10 minutes) interference-filled retention intervals. After accounting for this initial interference in item memory, there was less forgetting in item than source memory over a 1-day retention interval involving sleep. Notably, the item interference effect was independent of whether the material processed in between was more or less similar to the item-source material. We are currently conducting a replication that further explores the roles of similarity and mental activity for interference-based item forgetting as well as the effects of aging on item versus source forgetting.

It's a match... unfortunately? The prototypes of a good and a bad romantic relationship and their role in approach-avoidance goal pursuit

Lisa Klümper
University of Wuppertal

Past research postulated a prototype of a good relationship as a reference point for relationship quality evaluation. According to a two-dimensional relationship quality model, a prototype of a bad relationship is needed for a holistic view of relationship evaluation. I established the prototype of a bad relationship using a prototype analysis (Study 1, $N = 130$; Study 2, $N = 389$). In line with a cognitive-motivational approach, the prototype of a bad relationship should be an essential reference point for romantic avoidance motivation. In contrast, the prototype of a good relationship should be an essential reference point for romantic approach motivation. The impact of approach-avoidance goals on the prototypes' accessibility was examined using an experimental mixed design (Study 3, $N = 202$). After an approach-avoidance goal manipulation, participants categorized central and peripheral features of both prototypes during a reaction-time task. In general, central vs. peripheral features were categorized faster, but the approach and avoidance

goal inhibited the prototype structure of a bad relationship. A correlational study (Study 4, $N = 278$) examined the prototypes' role during relationship evaluation depending on differences in approach-avoidance motivation. Participants indicated the presence of the prototypes' features in their relationship and their approach-avoidance motivation. Results showed that the distances to both prototypes were associated with relationship quality evaluation. The distance to the prototype of a bad relationship was critical for avoidance-motivated persons, whereas the distances to both prototypes were critical for approach-motivated persons. The results are discussed via a cognitive-motivational perspective on relationship quality evaluation

It's good and it's bad: Sampling processes can generate decision-framing effects

Zachary Niese & Mandy Hütter
University of Tübingen

Framing a choice in terms of gains versus losses can have a dramatic impact on peoples' decisions, sometimes completely reversing their choices. This decision-framing effect is often assumed to stem from individuals' inherent motivational biases to react more strongly to negative information. However, more recent work suggests these decision biases can also stem from biases in the information samples based on which people make their decisions. Here, we test how biases in the frequency of information people have about each decision option can produce decision-framing effects via a sampling process. Specifically, we hypothesize that a gain versus loss framing determines whether people probe their memories for positive or negative information about each decision option. This can lead to inaccuracy if there are biases in the amount of information people have about each option. That is, when people have more information about one option, it is possible that they retrieve both more positive and more negative information about it, creating a bias to select it as being both more and less likely to result in success, depending on decision framing. Three experiments show that people's decisions are more accurate with a gain (vs. loss) framing when a high (vs. low) frequency option has a higher proportion of success; but decisions are less accurate with a gain (vs. loss) framing when the high frequency option has a lower proportion of success. The current results suggest that decision-framing effects do not necessarily indicate a motivational bias. Instead, sampling processes may underlie decision-framing effects.

Je mehr eHMI, desto besser? Querungsentscheidungen von Fußgänger:innen an Einmündungen mit Signalen von automatisierten Fahrzeugen

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Die Kommunikation von automatisierten Fahrzeugen mit anderen Verkehrsteilnehmenden soll durch externe Mensch-Maschine-Schnittstellen (eHMIs) unterstützt werden, wenn sich Fahrzeugnutzende von der Fahrzeugführungsaufgabe abwenden. Forschungen zu

eHMIs und deren Auswirkungen auf das Verhalten von Menschen im Straßenverkehr finden überwiegend im Szenario der Interaktion zwischen einer Person und einem Fahrzeug statt. Straßenquerungen von Fußgänger:innen, bei denen mehrere Verkehrsteilnehmende gleichzeitig aufeinandertreffen, wurden bisher wenig untersucht. Auch in diesen Situationen sollen eHMIs eine sichere, effiziente und komfortable Querung von Fußgänger:innen ermöglichen. Gleichzeitig muss einer Informationsüberflutung sowie Ablenkung von Fußgänger:innen durch eHMIs von automatisierten Fahrzeuge vorgebeugt werden. Dieser Beitrag hat zum Ziel, Querungsentscheidungen einer Fußgängerin/eines Fußgängers bei der Interaktion mit mehreren automatisierten Fahrzeugen in Abhängigkeit des Informationsgehalts von eHMIs im Szenario der Einmündung zu untersuchen. Dazu wird eine quasi-experimentelle Studie mit 25 Testpersonen in einer virtuellen Versuchsumgebung durchgeführt. Im Within-Subject Design interagieren die Testpersonen mit drei eHMI-Konzepten, die sich im Informationsgehalt unterscheiden (Status-, Detektions-, Intentionsanzeige). Die insgesamt acht Szenarien setzen sich aus der Anzahl der Fahrzeuge (ein, zwei) und der Fahrstrategie und Manöver der Fahrzeuge zusammen. Aufgenommen werden sowohl objektive Messgrößen (Entscheidungszeit, Bewegungsanalyse) als auch subjektive Messgrößen (Vertrauen, Komfort). Die Ergebnisse geben Aufschluss über die Auswirkungen von eHMIs auf die Querungsentscheidung von Fußgänger:innen in Situationen mit mehreren automatisierten Fahrzeugen.

Judgements of learning are based on memory strength: Evidence from visual and verbal tasks

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The theory that Judgements of Learning (JOLs) are based on memory strength is considered outdated. However, this literature ignored the possibility that the strength of working memory representations is used to infer the likelihood of remembering at a delayed memory test. In three preregistered experiments, we show that working memory representations guide inaccurate JOLs. In Experiment 1, participants memorized sequences of two or four colored objects, then they provided JOLs for a delayed test, and performed an immediate test on the objects' colors. After learning 200 objects, the delayed test on all studied objects followed. Sequence-length affected immediate, but not delayed performance. JOLs, however, were higher for sequences of two than four, correlating higher with immediate than delayed performance. Experiment 2 replicated the sequence-length effect on JOLs in the absence of an immediate memory test. In Experiment 3, we observed that working memory strength guided JOLs in a verbal task: Participants memorized sequences of six words, provided JOLs for each word, and subsequently performed an immediate memory test on the words. A final delayed memory test occurred after learning of 48 words. Immediate memory performance was highest for words presented in the first positions of the list and decreased over serial position. In line with the memory strength theory, JOLs were also higher for the first list positions and decreased with serial position. Our results suggest that people base their JOLs on the quality of their ongoing working memory representations, therefore challenging the predominant view of exclusively inferential, cue-based JOLs.

Knowledge about artificial intelligence (AI) moderates the relationship between risk and opportunity perception of AI and people's willingness to use AI-based applications

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Surveys around the world show that the public perceives artificial intelligence (AI) as a two-edged sword: as a risk but also as an opportunity. So far however, there has been no research investigating how people's risk-opportunity perception relates to people's willingness to use AI-based applications. In the presented study we investigated the relationship between (i) risk-opportunity perception of AI, (ii) AI knowledge, and (iii) willingness to use AI. To this end, we conducted an online study with $N = 245$ participants. For the risk-opportunity assessment participants had to judge one out of four different scenarios describing AI applications in various contexts (medicine, transport, media, psychology). AI knowledge was assessed using a newly developed 12 item questionnaire. Willingness to use AI was measured by giving participants the option to choose between using vs. not using AI (for example to analyze a beforehand filled out health questionnaire) at the end of the study. As hypothesized, risk-opportunity perception of AI correlated positively with the probability to use AI. Furthermore, accurate knowledge moderated this relationship in that, for participants with higher AI knowledge the risk-opportunity assessment plays a negligible role regarding their willingness to use AI. By including opportunity perception as a predictor variable for willingness to use AI, rather than solely risk perception, this study expands existing research that is mainly focused on risk-taking behavior only. Moreover, results underline the importance of accurate AI knowledge as a moderating factor regarding the willingness to use AI applications.

Language production in social interaction: Picture-word interference in communicative settings

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When speakers process in close temporal proximity semantically related words, language production is typically delayed. To investigate whether semantic interference is also observed in communicative settings we embedded a picture-word interference task in a card game: one speaker read the distractor word and, after a stimulus-onset-asynchrony (SOA) of either -150ms or -650ms, the second speaker was prompted to name a semantically related or unrelated target picture. In two experiments ($N = 32$ each) speakers did not demonstrate semantic interference in this setting, at neither SOA. In fact, when processing the conceptual relationship between distractor and target was further encouraged, speakers experienced facilitation at SOA-650. In a third experiment ($N = 32$) we inserted identical timing parameters and stimuli in a single-speaker setting. Here, speakers experienced semantic interference. The striking differences between the pattern of results found in communicative compared to single-speaker settings highlights the importance to investigate language production in settings in which it typically occurs, namely in social

interaction.

Language switching when writing: The role of phonological and orthographic overlap

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Language switching is a behavior that is not only important in its own right, but has also been used to investigate the cognitive control mechanisms that bilinguals employ during language comprehension and production. Even though language switching has been the topic of many research studies, it has mostly been investigated when switching while speaking and not while writing. Thus, our study had two goals: 1) to investigate whether language switching between written words is characterized by similar behavioral markers and therefore cognitive processes as language switching between spoken words; 2) to examine the extent to which phonological and/or orthographic overlap facilitates language switching between written words. In three experiments ($N_1 = 34$; $N_2 = 57$; $N_3 = 39$), German-English bilinguals completed a cued language switching task via an Internet platform where responses in their more dominant language (L1) and secondary language (L2) had to be given by typing. Participants were recruited locally as well as on a recruitment platform. To-be-named translation-equivalent concepts were systematically selected to either be highly similar in phonology, orthography or neither, and reaction times as well as error rate were analyzed. Participants showed switch costs and reversed dominance effects consistent with people inhibiting their L1 to prepare for switches. In addition, language switching was facilitated both by phonological overlap (cognate facilitation effect) as well as orthographic overlap. We conclude that language switching in the written domain is governed by similar cognitive processes as in the spoken domain. In addition, our results imply that orthographic overlap of translation-equivalent words may also impact language switching in the spoken domain.

Large stakes, big mistakes? Examining the dose–response relationship between reward value and task-switching performance

Erik Bijleveld
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According to classic work in psychology, the relationship between reward value and performance should follow an inverted U-shape. Specifically, moderately valuable rewards should increase performance; extremely valuable rewards should decrease performance. Here we examine this putative inverted-U in a task switching paradigm. In Study 1, contrary to our hypothesis, we found that moderately valuable (€0.50) and extremely valuable rewards (€10) both improved task switching performance. Study 2 largely replicated this pattern using a loss frame (instead of a gain frame). In Study 3, we found evidence for the predicted inverted-U-shaped relationship. However, we only found this effect when physical reward cues were present, i.e., when the money that could be lost

was placed on the table, in full view of the participant. Also, we found the inverted-U only on repeat trials (not switch trials). From these studies, we draw three cautious conclusions. First, people are well able to protect task switching performance when extremely valuable rewards are at stake. Second, when people do perform poorly when extremely valuable rewards are at stake, visual distraction may play a key causal role. Third, poor performance when extremely valuable rewards are at stake, may be caused by people adopting an overly flexible cognitive control state. We discuss these findings against the background of research on metacontrol, stress, and 'choking under pressure'.

Lateralization in the planarian *Schmidtea mediterranea*

Dagny Kirstin Goßmann, Jannes Freiberg, & Christian Kaernbach
Kiel University

In recent decades, lateralization has become a major focus of neurobiology. While it was historically thought of as a unique feature of humans, research shows that many vertebrate species feature lateralization as individuals or even populations, and even some invertebrates are lateralized. Our study observes lateralization in the planarian *Schmidtea mediterranea*. Planarians, while more primitive and evolutionary early, bear a striking resemblance to vertebrates in their genetic code as well as hormonal and dopaminergic systems. This makes planarians a likely relative to the ancestors of vertebrates, suggesting that lateralization may be traced back the evolutionary history of vertebrates back to its invertebrate roots. To this end, planarians were tested in T-labyrinths for their directional preferences between equal choices of food, shelter or empty labyrinth-arms. To test directional preferences on a population-level, 200 worms were tested in each setting, while also populational preferences between food and shelter were assessed. Furthermore, 10 planarians were observed on an individual level for their directional preferences in 10 subsequent testings for each preference. While no directional lateralization could be found on population-level, our data suggests individual lateralization of the planarians which may be linked to the size of the animal.

Lateralized EEG activity reflects retinotopic and screen-centered coordinates during visual short-term memory retention

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Visual short-term memories (VSTM) are stored in the visual system in a lateralized manner, whereby each hemisphere primarily stores information from the contralateral hemifield. This lateralization is reflected in two electrophysiological markers of VSTM: the contralateral delay activity (CDA) and alpha-band lateralization. When the eyes move during memory maintenance, do these lateralized signals primarily reflect the memoranda's retinotopic location before the saccade, or their saccade-independent spatiotopic location? To address this question, four objects, each consisting of two colored squares, were presented to the left, right, above, and below initial fixation, and participants mem-

orized the colors of one of these objects. During the pre-saccade maintenance interval, both CDA and alpha power were lateralized according to the location of the memorized object. Participants then made a left or right saccade, or maintained central fixation. After another maintenance post-saccade interval, participants performed a color change detection task at the new fixation. During the post-saccade interval, the CDA continued to be lateralized relative to the memorized object's original retinotopic location, even if the saccade had now moved that location into the opposite hemifield. By contrast, alpha power was lateralized depending on saccade direction and relative to the objects' post-saccadic location (i.e., at the screen's center), even in a control condition without any memory requirements. The results indicate that the CDA reflects memory representations coded in retinotopic coordinates, while alpha lateralization in this task reflects a lingering trace of attention towards salient, but not necessarily task-relevant screen locations.

Light avoidance of the planarian *Schmidtea mediterranea* tested with illumination from below

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The planarian *Schmidtea mediterranea* has been studied extensively because of its regenerative capabilities. Its behavioral repertoire has only recently come into focus. Here we report a new methodology to test the behavior of these animals, based on their well-established negative phototaxis. While this is usually tested with light from above (as would be the ecological situation), we explored the possibilities to demonstrate negative phototaxis with light from below, realized via a TV screen controlled by a computer. An advantage of this approach is that it offers an easy way to record the movements of the planarians in the light as well as in the dark, as there are no shading obstacles needed to create attractive dark areas. Another advantage is the flexibility in creating varying illumination landscapes within a fraction of a second. We placed 20 planarians in a petri dish that was placed on a TV screen that was put down horizontally on a table. We recorded the movements of the planarians with a camera placed above that setup. By varying the image that was shown on the TV screen we could expose the planarians to any sort and amount of light, depending on their position. We deployed checkerboard patterns with white and black fields and recorded the reactions of the planarians. At a given moment we would inverse the checkerboard pattern and record the reaction to this. We found a pronounced negative phototaxis as a reaction to illumination from below. This offers new possibilities in the behavioral research of photophobic planarians.

Lighting color temperature effects on mental effort

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In this presentation, we will give an overview of the first experimental studies investigating how ambient lighting affects mental effort, which is defined as the mobilisation

of resources to carry out a certain behaviour. Considering light's non-visual functions that include effects on circadian entrainment, sleep, hormones, mood, alertness, or attention, we proposed that light should also affect mental effort. More specifically, we predicted, that a higher colour temperature of light (containing a higher proportion of short-wavelength light) should lead to lower effort compared to a lower colour temperature of light. Our first study (Lasauskaite & Cajochen, 2018) confirmed these predictions: higher colour temperature of light lead to stronger effort during a 5-min modified Sternberg task, preceded by a 15-min light exposure period. The second study (Lasauskaite, Haselhoff & Cajochen, 2018) showed that by decreasing light exposure to 4 minutes, this effect disappeared. Finally, the third study demonstrated that the lighting colour temperature effect on effort-related cardiovascular response can be replicated for an auditory task. This finding shows, that these non-visual effects of light on mental effort hold for visual as well as auditory sensory inputs during cognitive tasks. Finally, we will discuss possible underlying mechanisms for light's impact on mental effort.

Little learning about nothing? How category label and outcome reward shape category generalization

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Learning how to categorize stimuli (e.g., medical diagnoses) associated to different decision consequences (rewards) is an every-day feat. We investigated whether gaining category-specific rewards (category A: 1 vs B: 0.1) when learning how to predict the categories (i.e., correct prediction yields reward) affects performance and the transfer of category representations to unknown/novel instances (generalization; e.g., "How likely is outcome A, given stimulus X"). The task was to find "Vases" on a horizontal plain. We presented stimuli from a very small range of locations, all of them leading to the same 'common' category with 75% (probabilistic). During learning, participants had to predict the category (trial-and-feedback) and collected payoffs for correct predictions. We manipulated the label of the common category (Vase vs. Nothing) and category reward (Equal for both vs. Common High vs. Rare High; fully crossed between). After learning, participants estimated the category probabilities in a transfer phase, in which we presented all possible (novel) locations on the plain (generalization task). We found (1) categorizations during learning were biased towards the high-reward category, which made performance in the *Common High* condition more optimal, compared to the *Equal* baseline (probability matching), but detrimental in the *Rare High* condition. (2) During transfer, first, we observed rule extrapolation (e.g., left location → common, right → rare) although participants never saw such regularities. Second, both label and reward seemed to modulate the extent of such 'strategies'. From the perspective of the Category Abstraction Learning model (CAL), we show that "Nothing" seems neglected during learning, and that category reward can shield or enhance this trend.

"Looking at nothing" while comprehending a dynamic driving scene

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While driving, people build a visuo-spatial representation of the environment and retrieve pieces of information from it during situation comprehension, like actual speed limits that are often no longer visible to the driver. While retrieval is crucial for safe driving behavior, memory processes have not been well investigated, possibly because suitable methods were missing that would allow inferences about retrieval processes during situation comprehension. We tested if eye movements based on the so-called "looking-at-nothing"-behavior (LAN) can be studied to gain insight into the underlying retrieval dynamics. Previous research using static scenes has shown that LAN can reveal which information is retrieved from memory as people tend to fixate spatial positions of visually encoded information, even if it is no longer visible at that location. In one experiment, participants ($N = 33$) viewed dynamic traffic scenarios on a reduced screen and evaluated auditory statements relating to different levels of situation awareness (SA) while eye movements were recorded. Results showed that when retrieving information of SA levels 1 and 2, subjects fixated more on emptied spatial locations associated with information relevant for the probed SA level. The retrieval of anticipations (SA level 3) resulted in more sequential gaze transitions that corresponded to the spatio-temporal dynamics of future driving behavior. The results support the idea that drivers build a visuo-spatial representation of the driving situation. Different gaze patterns when retrieving level-specific information indicate divergent retrieval processes. Thus, LAN can be used to study memory retrieval to advance knowledge on driving-related situation comprehension.

Maintenance of stereotypical expectations through contextualization of stereotype-incongruent behavior

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To date, several psychological mechanisms contributing to the maintenance of stereotypical beliefs have been identified. One of these mechanisms constitutes the contextualized processing of information which contradicts stereotypical beliefs, that is, the incorporation of contextual cues into the representation of an object, person, or group. Using a modified predictive learning paradigm, the present study ($N = 369$) investigated the contextualization of stereotype-incongruent behaviors shown by either a member of a German student fraternity or a member of a politically left group. In the learning phase, participants formed associations between the target person's behaviors (congruent or incongruent) and the people accompanying him, representing the social context. To this end, we manipulated the predictive value of the context persons such that the target's (in)congruent behaviors were perfectly associated with the presence of one context person, respectively, while another context person was present independent of whether the target behaved (in)congruently. In the subsequent test phase, we varied the social con-

text and assessed the proportion of predicted stereotype-congruent or incongruent behaviors depending on who the target was with. Results showed that participants formed context-dependent expectations of participants' behaviors, and that behavior predictions were influenced by participants' political identity. We discuss the role of motivated contextualized information processing for the maintenance versus change of stereotypical expectations.

Manipulating stimulus-action effect compatibility to identify the source of dual-task costs

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Dual-task costs are theorized to stem from conflict between the central operations for the two tasks. One task component contributing to this conflict is the action effects that follow the responses (e.g., auditory effects produced when speaking). In a series of dual-task experiments, we designed tasks that were followed by experimentally-induced action effects that were either modality-compatible or -incompatible with the stimuli. Tasks with modality-compatible action effects (visual stimulus, visual effect) produced smaller dual-task costs than those with modality-incompatible action effects (visual stimulus, auditory effect), demonstrating that the relationship between stimuli and action effects contributes to dual-task costs. Moreover, modality-compatible pairings showed an advantage compared to when no experimentally-induced action effects were added. Follow-up experiments focused on identifying the source of these costs—a monitoring bottleneck, shortened central stages, resource competition, or crosstalk—with evidence favoring the crosstalk account. These results add to a growing body of work illustrating how central operations act on representations that include stimuli and action effects.

Meaningful comparisons with ordinal-scale items

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Ordinal rating scales – say that from strongly agree to strongly disagree with a proposition – are exceedingly popular in various areas of psychological research. When comparing ratings distributions between conditions, researchers often resort to parametric or nonparametric tests of central tendencies such as means or medians. Before calculating statistics of location for ordinal scales and comparing them, however, we should consider a fundamental question: Is it appropriate to reduce the relationship between the two ratings distributions to a simple metric such as a difference in central tendencies? In this talk, we propose a set of models to guide researchers in addressing this question and drawing meaningful inferences from ordinal scales. We develop four statistical models that represent possible relationships between two ratings distributions: a null model, a parametric single-relation model, a nonparametric single-relation model, and a multiple-relations model that accounts for complex effects. We show how these models can be compared in light of data with Bayes factors and provide a Shiny app for researchers who

wish to adopt the proposed approach. Finally, we illustrate its usefulness with real-world examples.

Measurement models for visual working memory – a factorial model comparison

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Several measurement models have been proposed for data from the continuous-reproduction paradigm for studying visual working memory: The original mixture model (Zhang & Luck, 2008) and its extension (Bays, Catalao, & Husain, 2009); the interference measurement model (Oberauer, Stoneking, Wabersich, & Lin, 2017), and the target confusability competition model (Schurgin, Wixted, & Brady, 2020). This article describes a space of possible measurement models in which all existing models can be placed. The space is defined by three dimensions: (1) The choice of an activation function (von-Mises or Laplace), the choice of a response-selection function (variants of Luce's choice or of signal detection theory), and whether or not memory precision is assumed to be a constant over manipulations affecting memory. A factorial combination of these three variables generates all possible models in the model space. Fitting all models to eight data sets revealed a new model as empirically most adequate, which combines a von-Mises activation function with a signal-detection response-selection rule. The precision parameter can be treated as a constant across many experimental manipulations, though it probably varies between individuals.

Mental rotation of tactic board instructions in basketball: Domain-specific expertise improves on-court performance

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In basketball, tactical instructions are presented on tactic boards under temporal constraints (e.g., during time outs). Based on the disparity in the orientation of the tactic board and the players' egocentric on-court viewing perspective, there are high affordances in visual-spatial transformation (e.g., mental rotation processes), which impede information processing and decrease execution performance. The aim of this study was to scrutinize how the effect of different orientations of visual tactical displays on information processing demands and execution performance is affected by expertise in basketball. Forty-eight participants were assigned to a group of experienced basketball players ($n = 24$) and novices ($n = 24$). They were instructed to execute a basketball playing pattern, which was presented on a virtual tactic board in one of five different spatial disparities to the players' on-court perspective. The self-controlled time for watching the instructions before execution was significantly shorter and spatial accuracy in pattern execution was significantly higher for lower disparities between instruction perspective and on-court perspective. Experienced basketball players displayed shorter observation times as well as higher accuracy as a global effect, being independent of stimulus orientation.

Moreover, the effect of orientation was lower in the experienced group as compared to the novice sample. Extensive experience over several years with visuo-spatial transformations of tactical instructions reduced, but not eliminated, the effects of model-observer disparity. Accordingly, coaches should align their tactic boards to their players' on-court viewing perspective to enable fast processing and to promote the errorless execution of tactical instructions.

Metacognitive awareness of auditory distraction: Global metacognitive beliefs and stimulus-specific judgements of distraction

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The duplex-mechanism account postulates that there are two types of auditory distraction that differ in the metacognitive awareness people have for the distracting effects. Specifically, this two-process account predicts that people should be aware of the disruptive effects of auditory deviants but should have little to no awareness of the interference produced by changing-state in comparison to steady-state auditory distractors. To test this prediction, participants were required to provide metacognitive judgements about the effects of auditory deviant, changing-state, and steady-state distractor sequences on serial recall. In two questionnaire studies, metacognitive beliefs about the effects of the different types of distractor sequences on serial recall were assessed. In another study, participants heard samples of the auditory stimuli before predicting the effects of these stimuli on serial-recall performance. Then, auditory distraction by the different types of distractors was assessed in a serial-recall phase. Finally, participants were asked to give retrospective judgements about the distraction they had experienced. The results suggest that participants are well aware of the effects of changing and deviant stimuli on serial-recall performance. The results thus contradict the idea that there are two types of distraction with differential access to awareness.

Metamemory accuracy for scene pictures: It depends on how and when you ask

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Although it is well known that recognition memory for naturalistic photographs of scenes is amazingly good and consistent across different observers (i.e., scenes are consistently likely to be remembered or forgotten), less is known about the accuracy of metamemory judgments predicting the stimulus-specific memory performance. There are conflicting results in the literature reporting either a lack of predictive validity of judgments of scene memorability (Isola et al., 2014) or a reasonably good metamemory accuracy of judgments of learning (JOLs; Undorf & Bröder, 2021). The former was assessed by asking for the generic stimulus attribute "memorability" (memorability judgment, MJ), whereas in

a JOL procedure, participants predict their own later memory performance for a stimulus. In two experiments (overall $N = 102$), we directly contrasted the two ways of assessing metamemory in a within-subjects-design to test whether the response format was responsible for the difference in accuracy. In both experiments, we found an interaction of response format with task order, showing much improved MJs after a preceding JOL task whereas MJs were inferior to JOLs when administered first. This robust result suggests that the assessment of the general stimulus characteristic "memorability" can be improved by a preceding learning experience during which participant predict their own memory performance for different stimuli.

Mixed-effects in information utilization: A multilevel regression-based approach to advice taking

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New information technologies and social networks make it increasingly convenient to access a wide variety of opinions and advisors. In an attempt to increase flexibility in how people's' advice taking behavior in different situations and contexts can be analyzed, we developed mixed-effects weights of advice, a multilevel regression-based approach to quantify weighting of different sources of information in (externally assisted) judgment formation. Essentially, regression weights of information sources are consistent with the established recommendation to use endogenous components as the criteria in an analysis that controls for exogenous components instead of building difference scores in previous research based on advice taking indices. By generalizing to mixed-effects, this novel modeling approach enables nonlinearities in weighting, individual differences in weighting of sequentially sampled advice, better predictions from shrinkage, and more. The multitude of technical merits of mixed-effects weights of advice ultimately implies a performance advantage over the current state-of-the-art in many situations as shown by means of an extensive simulation study. Moreover, the practical relevance of our tool becomes manifest in revisions of existing empirical evidence, such as the typical finding that on average judges tend to underweight advice in favor of their own initial opinions. In summary, the multilevel regression-based approach to advice taking offers a flexible and consistent solution to the endogeneity problem in previous research and thereby opens up new areas of substantive research.

Modality compatibility in voluntary task switching

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In task switching, modality-incompatible stimulus-response mappings (visual-vocal and auditory-manual) have been shown to elicit larger switch costs than modality-compatible mappings (visual-manual and auditory vocal). However, a recent study by Fintor et al. (2020) also demonstrated that modality compatibility can influence task choice rates in voluntary task switching: When instructed to use manual and vocal responses equally

often in a setup with visual and auditory stimuli, participants formed a higher share of compatible than incompatible modality mappings. Since this had been the only study which had examined modality compatibility in voluntary task switching so far, in the present study, we were interested in whether we could replicate Fintor et al.'s (2020) findings with a greater number of stimulus and response alternatives: Rather than a spatial-discrimination task with just two alternatives (left/right), we used number words 1-4 (visual or auditory) with four horizontally aligned keypresses (manual) or letter responses A-D (vocal). We replicated the bias to form more modality-compatible mappings, as well as the bias to repeat the task just performed, i.e. repeat the same response modality. The modality-compatibility effect on switch costs was inverted, with higher response times on modality-compatible trials. Finally, we found manual dominance, rather than vocal dominance as in the preceding study. This is likely due to easier transformation from number words to horizontal keys along the mental number line, compared to the transformation to spoken letters. Together, this provides more evidence suggesting that modality compatibility biases flexible choice as a structural constraint.

Modality incompatible episodes trigger adaptation processes

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The ease of responding to discrete stimuli is determined by many factors, one of which is the modality relation of stimuli and responses. For example, responding manually to a visual stimulus or vocally to an auditory stimulus (modality compatible mappings) produces superior performance compared to the reverse pairings (modality incompatible mappings). Here, we studied the aftereffects that such modality (in)compatible responses trigger. Participants responded to visual stimuli on screen and to auditory stimuli presented via headphones. Responses could be given manually via button presses, or vocally via microphone. Modality compatibility varied in a trial-by-trial manner. Results show that responding based on the modality incompatible mapping improves subsequent modality incompatible responses but deteriorates performance in subsequent modality compatible episodes. However, when mixed with a Simon task, we found no sequential modulation between tasks. This suggest that modality incompatible episodes trigger within-task adjustments that seem similar to conflict adaptation processes, whereas the cognitive mechanism for these within-task adjustments does not seem to benefit between-task adjustments.

Modeling risky choice with nonmonetary consequences

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The development of formal models of decision making under risk has been shaped by how people decide between options with monetary outcomes. Whereas these models—with cumulative prospect theory (CPT) as its most prominent example—are successful in predicting such monetary choices, they provide a rather poor account of people's choices

between risky options with nonmonetary outcomes (e.g., outcomes of medical treatments). Focusing on CPT, here we test psychologically motivated modifications of three basic assumptions underlying traditional models of risky choice: a) using affective ratings of the outcomes (rather than monetary equivalents) to quantify the outcomes; b) assuming context-dependent valuation of outcomes; c) assuming affect-dependent probability weighting. We submitted variants of CPT implementing these modifications to a rigorous model comparison. The results show a clearly superior performance of these variants when modeling choices with nonmonetary outcomes, but not when modeling choices with monetary outcomes. The best-performing model indicates that in choices with nonmonetary outcomes, the affective value of the worst outcome in a choice problem determines the processing of the entire problem. We discuss the implications of our findings toward a better understanding of the psychological underpinnings of nonmonetary risky choice, and how the processes differ between choices with monetary and nonmonetary consequences. We show that the conclusions also hold when implementing the modified assumptions in other modeling frameworks (e.g., decision field theory). Our results underline that some key assumptions of prominent models of risky choice do not generalize to decisions with nonmonetary consequences.

Modeling the link between plausibility and the illusory truth effect

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The illusory truth effect refers to the phenomenon that repetition increases the perceived truth of statements. Recently, Fazio et al. (2019) argued that this effect does not only occur for ambiguous statements but is equally strong for plausible and implausible statements. However, this conclusion is based on specific assumptions about the psychometric properties of observable truth judgments. These auxiliary assumptions remain implicit in the original, simulation-based approach. As a remedy, we propose a formal mathematical model that describes the link between latent feelings of truth and observable truth judgments. In doing so, we discuss the importance of monotonic transformations for interpreting interactions. Moreover, we show that fitting the model to data in a Bayesian framework provides a stronger test of the theory compared to merely testing specific features of the shape of empirical estimates.

Models of confidence and reaction times in perceptual decision making

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Many decisions must be made with incomplete information. The ability to evaluate uncertainty in decisions is a key aspect of metacognition. As both confidence judgments and reaction times are expected to be closely related to sensory uncertainty, a mathematical model of perceptual decision-making should be able to explain them both. Here, we

propose the new dynamical weighted evidence and visibility model, an extension of the popular drift diffusion model of decision making, to account for choices, reaction times and confidence at the same time. The decision process in a binary perceptual task is described as a Wiener process accumulating sensory evidence about the choice options bounded by two constant thresholds. To account for confidence judgments, we assume parallel accumulation of information about the reliability of the present stimulus. In addition, there is a period of post-decisional accumulation of sensory evidence to allow for changes of mind. We examined model fits in two experiments, a post-masked orientation discrimination task and a direction discrimination task using random dot kinematograms, with varying stimulus discriminability. We compared the dynamic weighted evidence and visibility model with other sequential sampling confidence models: two-stage dynamical signal detection theory and several versions of race models, which assume two accumulators, each representing one alternative. The results show that only the new dynamic weighted evidence and visibility model produced an acceptable fit to choices, confidence, and reaction time. This finding suggests that confidence judgments may depend on parallel estimates of sensory uncertainty and additional post decisional accumulation even when decision and confidence are reported simultaneously.

Modulation of memory for schema-congruent and -incongruent information by propofol

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Evidence mainly from animal studies shows that the relatedness of new information to prior knowledge promotes accelerated integration of new information into neocortical networks, modulating memory consolidation. Whether this is also associated with a shorter involvement of the hippocampus during consolidation remains to be elucidated. Here, we combined a variant of a classic schema-learning task with a neuro-pharmacological approach to transiently interfere with hippocampus-dependent steps of memory formation during the post-encoding period. Patients without neuropsychiatric comorbidities that undergo short general anesthesia for elective surgery of strabism were studied. Immediately prior to anesthesia, subjects learned, across three cycles, a word list that consisted of 40 words that were either congruent with a soundscape provided by headphones (restaurant noise) or completely unrelated. Subjects then received anesthesia with intravenous propofol (bolus of 3 mg/kg for induction, followed by 6 mg/kg/h for about 60 minutes for maintenance). Three hours later subjects were tested for recognition and recall of words. Although there was no effect of propofol on recognition memory of words, we found a clear general benefit for schema-congruent words in recall, consistent with facilitated consolidation of schema-congruent items. Propofol patients performed inferior to control subjects in recall of both word types, but also showed impaired learning, suggesting a combined effect of pre-surgical arousal and general anesthesia that preferentially affects schema-incongruent words. We infer that schema-congruency determines the susceptibility of early memory formation and consolidation to the modulation by general anesthesia.

Monitoring accuracy and working memory: A competition for resources account

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Knowing what one knows and accurately monitoring one's own capacities and performance on a moment-to-moment basis are important determinants of both immediate task success and educational achievement. Individual differences in such metacognitive monitoring are well documented, but what determines an individual's monitoring accuracy in a particular context is yet to be fully understood. One candidate contributor to monitoring accuracy is working memory. In this study, we investigated whether and how working memory contributes to the accuracy of monitoring processes. Up until now, most evidence for a positive relationship between working memory and monitoring accuracy has been provided by correlational studies. Here, an experimental approach was applied in which the working memory demands of the task were varied and the impact on monitoring accuracy assessed. In two out of three experiments, monitoring accuracy suffered when working memory demands increased. These results indicate that the overall demands of the task determine whether participants engage in more effortful direct online monitoring or rather integrate various cues to generate confidence judgements. Further, it appears that the processes involved in direct online monitoring compete for resources with working memory.

More offside judgments against Schalke 04 than against Borussia Dortmund: A matter of figure-background contrast?

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Judging offside positions in soccer is an important and demanding task of the assistant referees. Here, we investigated the impact of player salience on the frequency of offside judgments in soccer. In a recent laboratory study, observers made more offside judgments against forwards wearing the dress of Schalke 04 (blue shirts, white shorts) than against forwards wearing the dress of Borussia Dortmund (yellow shirts, black shorts), when figure-background luminance contrast was higher for the former team. Here, we investigated whether a similar effect is present in publicly accessible data from the German Bundesliga. Results of study 1 showed a higher offside score for Schalke 04 than for Borussia Dortmund in matches between these clubs. Results of study 2 showed a higher offside score for Schalke 04, and a lower score for Borussia Dortmund, in matches of these clubs against all other teams of the German Bundesliga during one season. Together, results suggest that more offside judgments are made against teams of higher salience (i.e., figure-ground contrast). This pattern could be explained in terms of a simple strategy for making offside decisions.

More than the sum of its parts: A whole-picture advantage for learning with text-picture combinations

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People learn more deeply from text plus pictures than from text alone (Mayer, 2005; Schnotz, 2005). This multimedia effect was observed in numerous studies, with transfer measures often showing larger effects than knowledge measures. This pattern of results may arise because complete pictures showing arrangements of multiple smaller pieces provide an overall overview on the learning content: They provide information about relations between single parts and thus reveal structural features of the domain. If structural information contributes to the positive effect of pictures on learning from text, overall pictures should lead to better learning than partial pictures that show all relevant parts but not all relations between them. To test this hypothesis, in our experiment, participants learned about the geography of a fictitious kingdom either form text alone, from text passages plus partial pictures, or from text passages plus one overall picture showing the whole area of the kingdom. We measured learning performance with knowledge items (addressing content directly represented in the text or in the partial pictures) and transfer items (addressing overall relations that can also be inferred from combinations of partial pictures or text passages). Results demonstrate better learning from text and partial pictures than from text alone. Further, the overall pictures led to better performance than partial pictures for knowledge items and even more so for transfer items. We conclude that overall pictures contribute to multimedia effects especially when transfer is required: With an overall picture, less transfer steps are needed. Further, complete pictures also help to maintain smaller pieces of information by embedding them into an overarching arrangement.

Motivational effects on response inhibition in children with and without ADHD

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ADHD is one of the most common mental disorders in childhood and adolescence. Multiple factors cause a variety of symptoms, including a deficit in the ability to inhibit as well as abnormalities in the processing of reward and motivational processes. The aim was to investigate whether motivational rewards have a positive influence on the ability to inhibit and whether children with ADHD respond more strongly to motivational incentives than control children. In total 40 children aged 5 to 8 years, 20 children in an ADHD group and 20 children in a control group completed a Go/NoGo task, first without a motivational incentive and afterward with a motivational incentive. All children were found to improve their performance in the motivational condition. Children in the ADHD group also showed a steady improvement in inhibition performance in the reward condition. All children benefited from motivational rewards. In addition, children with ADHD showed an increased inhibition performance in the motivational condition, which

was not observed in the neutral condition.

Motor attention to the tactile modality induces sensory attenuation for sounds

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Our movements constantly change the way we perceive external stimuli. A prime example is sensory attenuation, a phenomenon that occurs when we actively produce a sensory event. Sensory attenuation has been reported for self-touch but also for the generation of sounds by button presses. In this study, we investigated a novel explanation of sensory attenuation. We assume that a pre-motor attention shift – which usually accompanies goal-directed movements – boosts tactile sensitivity at the location of the body that makes contact with the goal object. Attentional prioritization for the tactile modality during a goal-directed hand movement might lead to a transient reduction in sensitivity in other modalities, resulting in sensory attenuation for sounds. We presented stimuli in a virtual reality setup that allowed to manipulate the time of tactile feedback when pressing a virtual button. We found tactile sensitivity, in the hand that pushed the button, increasing the more the hand approached the button. In a second experiment, participants had to push a virtual button in order to produce a sound. They had to estimate its intensity compared to a second sound that appeared 700ms later. Participants either received tactile feedback at the time they touched the button or at the time of movement start. We found sensory attenuation for sounds only when tactile feedback was provided at the time the movement goal was reached. Together, these results suggest that a pre-motor tactile attention shift briefly decreases auditory sensitivity. We conclude that sensory attenuation for sounds occurs because tactile attention is boosted when reaching the movement goal, leaving reduced attentional resources for the auditory modality.

Movement trajectories reveal goal anticipation in prevention actions

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Research on action control has mainly focused on actions that aim at causing perceivable effects in the environment. However, not all actions aim at causing an effect – rather, actions may also aim at preventing a certain event from occurring. Thereby, successful prevention inherently revolves around the absence of a perceivable change, posing critical challenge to the cognitive system. Previous research has shown a missing implicit component in prevention actions, suggesting a propositional action representation. Here we report three experiments showing that the location of a to-be-prevented event attracts the movement trajectories. This observation challenges previous interpretations of a fully missing implicit component in prevention actions, suggesting that a prevention action draws at least partially on associative representations.

Multimodal cohesion affects attention and interpretation: An eye-tracking study of film

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Multimodal cohesion is a method that describes and analyzes the means by which narrative discourse structures are "bound together" by information from different domains, e.g., visual, auditory, and verbal. Here we present an exploratory experimental investigation of how multimedial cohesion guides visual attention and narrative understanding. Using a cohesion analysis we identified important multimodal cues that film directors use to establish the setting of a scene and its semantic interpretation. We manipulated film scenes by blurring important cues to the setting or altering the soundtrack or verbal cues, and recorded viewers' eye movements as well as questionnaire data about the scene. Eye movement recordings suggest that removal of cues (a) caused less attention to be allocated to the blurred parts of an edited scene—which can be considered as a manipulation check, and (b) led to uncertainty about the setting of the subsequent unedited scene, which triggered active search behaviour in order to reduce that uncertainty. Questionnaire results supported this interpretation: Viewers of modified scenes were less certain about the specific identity of the setting, and replaced it with a more generic identity. Taken together, our results using experimental manipulations of film material show that film directors employ multimodal cohesive cues to guide their viewers attention and narrative comprehension.

Navigating the social environment: A sampling approach to trustworthiness

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The social environment is the collection of all possible social partners. Navigating such an environment is not easy. People have to interact with a social partners, collect information about the interaction, and use such information to form the impression guiding subsequent behaviors. The information search process shows specific sampling patterns depending from the goal at hand. Generally, people maximize their exposure to positive information when no explicit goal is available, truncating the sampling process early after negative information. Consequently, impressions will be based on unreliable negatively-skewed samples triggering small-sample bias. But information search strategies change with an epistemic goal. Here, the tendency to truncate sampling after negative information vanishes as early truncation interfere with the epistemic goal. Now information quantity is more rewarding than its valence and the rational behavior is to collect as much information as possible despite its content. In four experiments ($N = 402$), we demonstrated that early truncation, and small-sample bias, occur when no explicit goal is provided. This tendency is reduced under an epistemic goal. In a totally unconstrained information sampling paradigm, participants went through the sampling phase knowing that later they will be asked to perform a task whose completion requires the sampled

information. Knowing the final task in advance allowed our participants to tailor their sampling behaviors to their goal. If the task implied an epistemic goal, participants avoided early sampling truncation and obtained larger samples. Final impressions were directly related to the available samples. If a bias is there, it is in the sampling process rather than in the information integration stage.

Negotiating with an algorithm? How AI as negotiation counterpart affects negotiators' trust and subjective value expectations

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Technological progress will make the use of artificial intelligence (AI) as negotiation counterpart possible in the future. However, how human negotiators react to such technology use is largely unclear. Therefore, we investigated how AI as negotiation counterpart influences negotiator trust and expectations regarding an upcoming negotiation. In a preregistered vignette study, participants ($n = 290$) imagined a job negotiation. We manipulated the type of negotiation counterpart (human - AI with human representation - AI without human representation) and assessed participants' trust intentions and expectations regarding an upcoming negotiation. Results showed higher trust and more positive expectations for human counterparts as compared to AI-agents. Human-like representation of AI had no effect. Moreover, high technology commitment reduced the negative effect for AI as negotiation counterpart. Overall, our findings suggest that companies should be cautious when using AI-agents for negotiations despite opportunities offered by technological progress.

Neural correlates of divergent and convergent problem-solving indicate common mechanisms beyond shared working memory-related activity

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Although the relationship between creative and intelligence-based problem solving has been studied extensively with divergent and convergent thinking tasks, the underlying neural mechanisms of this relationship are still under debate. As both have been associated with working memory, the question arises if there are shared underlying mechanisms other than working memory related activity. We examined how divergent and convergent problem-solving, as measured by the creative reasoning task (CRT) and Raven's Advanced Matrices (APM), respectively, are characterized by EEG oscillatory modulations in the upper alpha band ($10 - 12$ Hz). To account for the temporal variability due to the different cognitive stages in the problem-solving process, we investigated divergent and convergent problem-solving at early, intermediate and late stages of each self-paced

trial. In addition, we separated processing phases according to predominantly divergent and convergent thinking processes. Furthermore, we measured working memory within the same knowledge domain and by using highly comparable stimulus material. This data, we then used to observe upper alpha band modulations beyond working memory-related activity in both divergent and convergent problem-solving processes. By introducing this methodological approach, we provide evidence for a higher fronto-parietal alpha synchronization in divergent relative to convergent thinking, especially towards the end of the problem-solving process. Furthermore, we provide evidence that creative and intelligence-based problem-solving share underlying mechanisms beyond task demands that rely on working memory processes.

Neural oscillatory indicators of optimal preparation for flexible action adjustments

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Cognitive conflicts typically arise in situations which call for sudden changes in our behaviour. Resolving cognitive conflicts is challenging and prone to errors. Humans can improve their chances to successfully resolve conflicts by mentally preparing for potential behavioural adjustments. Previous studies indicated that neural theta oscillations ($4-7$ Hz), as well as alpha oscillations ($8-14$ Hz), are reflective of cognitive control processes during conflict resolution. However, the role or neural oscillations for conflict preparation is still unclear. Therefore, the aim of the current study was to determine which oscillatory changes during conflict preparation predict subsequent resolution success. Participants performed a cued change-signal task, in which an anticipatory cue indicated if the upcoming trial might contain a cognitive conflict or not. Oscillatory activity was assessed via EEG. Cues which indicated that a conflict might arise compared to cues which indicated no conflict led to increases, directly followed by decreases, in theta power, as well as to decreases in alpha power. These cue-induced changes in theta and alpha oscillations occurred widespread across the cortex. Importantly, successful compared to failed conflict trials were characterized by selective increases in frontal theta power, as well as decreases in posterior alpha power during preparation. Additionally, higher frontal theta power and lower posterior alpha power during preparation predicted faster conflict resolution. Our study shows that increases in frontal theta power, as well as decreases in posterior alpha power, are markers of optimal preparation for situations, which necessitate flexible changes in behaviour.

Neuronal mechanism for the insight memory effect

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Increased evidence suggests that insight (sudden comprehension involving an AHA! experience) during problem solving enhances memory for those problems compared to those solved without insight (Danek et al., 2013; Kizilirmak et al., 2016). However, the un-

derlying neuronal mechanism for this insight memory effect still remains unknown. One study investigating visual insight found activity in the anterior medial temporal lobes (MTL) predicting later memory for those tasks (Ludmer et al., 2011). However, because the solution was induced and the AHA! experience was not assessed, it remains unknown whether MTL activity is related to insight. We tested 30 subjects using a visual and verbal insight task in the MRI and asked them to rate how strongly they experienced an insight after each solution. Additionally, they performed a subsequent memory test (recognition of the insight problems from both tasks) four days later. One a behavioral level, we replicated the insight memory effect: subjects were more likely to remember the insight tasks the stronger they rated their insight during solution in the scanner. On a neuronal level, we found overall activity in medial prefrontal cortex, bilateral anterior lateral temporal and MTL regions (including hippocampus) during solution predicting later memory for verbal and visual insight combined. Importantly, activity in bilateral hippocampus was parametrically modulated by the amount of experienced insight during solution. This is first evidence for a neuronal mechanism of the insight memory effect: insight increases activity in the hippocampus necessary for binding content representations of the respective tasks into a durable memory representation.

Never gonna give you up even when it's suboptimal – fixation of foraging strategy under different environments

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Previous research showed that animals adopt different foraging strategies in different environment settings. However, research on whether humans change foraging strategies depending on the environment has shown little evidence of a change in strategies. This study attempted to investigate whether humans will adapt their foraging strategies when the performance differences between strategies are bigger, and participants have more opportunities to experience the patch quality than previous research. We targeted two commonly used foraging strategies: the Give-Up-Time (GUT) strategy and the Fixed-Number (FN) strategy. The GUT strategy can perform close to the optimal leaving behavior in tasks with different patch qualities but suffers when the patch qualities' variance is minimal under the current environment. The FN strategy is less flexible under the environment with high variance in patch qualities but is optimal for a low variance environment. In an experiment with $N = 124$ participants and average 350 foraging decisions (i.e., stay in a patch or leave) per participant, we manipulated the distribution of patch qualities (varied vs. uniform) in a between participants design. On average, participants experienced 36 ponds showing that they had ample chances to experience the environment. Nevertheless, model comparisons to identify participants' foraging strategies indicated that participants showed a tendency to adopt the GUT strategy regardless of the environment. Replicating previous research, the finding hints that humans have a preference to apply the GUT strategy in foraging tasks and that this preference can not be easily overruled even with fairly ample learning opportunities.

Objective and subjective word frequency affect judgments of learning in multiple-cue situations

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Research has shown that people are capable of using multiple cues when making metacognitive judgments such as judgments of learning (JOLs) – predictions of one's future memory performance. Past research has shown that word frequency (i.e., how often words are encountered in the language) affects people's JOLs when manipulated in isolation. It remains unclear, however, whether subjective word frequency (i.e., the subjective familiarity of words) would impact JOLs over and above objective word frequency and whether frequency effects on JOLs would persist when another cue is simultaneously manipulated. Here, we aimed to close these gaps by testing if objective and subjective word frequency affect JOLs when font size is also manipulated. In three experiments, participants studied words that varied in word frequency (Experiment 1: high and low objective frequency; Experiment 2: a continuum ranging from high to low objective frequency; Experiment 3: high and low subjective and objective frequency) and were presented in a large (48 point) or a small (18 point) font size, made immediate JOLs for all words, and completed a free recall test. Results showed that people based their JOLs on word frequency and font size even though only word frequency impacted their actual memory performance. Moreover, both objective and subjective frequency guided people's JOLs, suggesting that subjective word frequency contributes to the word frequency effect in metamemory. We conclude that word frequency effects in metamemory are pervasive in multiple-cue situations.

Oculomotor evidence for inter-individual differences in the acquisition and adaptation of long-term context memories: The role of global processing bias and executive control

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Visual search becomes more efficient if the target item is consistently encountered within a stable spatial arrangement of distractors, as such context is thought to guide visual search (contextual cueing; Chun & Jiang, 1998). The default local relative to global processing bias in participants was shown to further facilitate context learning (Bellaera et al., 2014). In contrast, changes of the target location in a nevertheless constant array weakens contextual cueing. Here, we tested whether global-local bias dichotomy, as well as participants' executive control capacities and mental rotation abilities can modulate the acquisition and subsequent adaptation of already formed context memories. We also recorded participants' eye-movements to explore whether the potential modulations would be expressed both in the reaction times and oculomotor measurements (number of fixation, saccade amplitudes, exploratory and confirmatory saccades). As a result, the cueing effect was reduced significantly in the relocation phase after it was established successfully in the initial learning phase. Additionally, while the default local bias indeed facilitated initial acquisition of context-memories (in line with Bellaera et al., 2014), this

effect was reversed in the relocation phase, where more global attentional bias, as well as enhanced executive control, resulted in more efficient adaptation in both behavioral and eye-movement measurements.Together, these findings provide behavioral and oculomotor evidence for the role of inter-individual differences in the initial acquisition and subsequent adaptation of long-term context memories. Context learning and adaptation are not only dependent on physical properties of stimuli, but also on observers' attentional bias and executive control.

On the flexibility of attentional control in continuous behavioral tasks

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The theory of visual attention (TVA) has been considered by many to be the best candidate of current attentional accounts to explain patterns of human performance during continuous selection tasks where observers need to select a multitude of different targets among distractors (typically referred to as foraging tasks). The theory has the flexibility required to account for factors that can influence performance, such as value, salience and discriminability, and proximity. I will present new data from foraging by eye gaze and mouse selection. In this paradigm the value of different target types varies, to address how different priority settings affect foraging performance. Our observers performed four foraging tasks differing by selection modality and target value. During gaze foraging, participants had to accurately fixate the targets to select them and could not anticipate the next selection with their eyes, while during mouse foraging they selected the targets with mouse clicks and were free to move their eyes. We manipulated both target value and proximity. We found notable individual differences in search strategy, confirming the existence of internal biases towards value, proximity and priming. Initial steps at modelling these findings within a TVA setting will be presented.

On the interplay between information sampling and (pseudo)contingency learning in judgments and choices

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Ideally, correlations between variables are inferred based on their co-occurrences, like the individual frequencies of choice options and outcomes co-occurring (joint frequencies). Thus, to determine contingencies (e.g., between options and outcomes), information needs to be sampled and integrated at the level of aggregation appropriate for the task at hand. A wide range of studies, however, showed (a) that simple information sampling strategies can lead to premature avoidance of choice options believed to result in negative outcomes, leading to skewed samples, and (b) that individuals may base their contingency inferences on more aggregate data than would be appropriate, namely on observed skewed marginal frequencies instead of the observed joint frequencies. As a consequence, subsequent choices were demonstrated to be sub-optimal. In this project, we investigated

various factors that may affect information sampling and thus lead to asymmetries in the information available, which in turn might provide the basis for erroneous contingency judgments. But just as the characteristics of the available sample affect the kind and size of the contingency that is inferred, previously learned or expected contingencies may shape the sampling process. The results revealed that despite premature avoidance of certain choice options, self-determined information sampling can foster the proper use of the sampled information for contingency judgments. The likelihood of genuine contingency inference increasing if individual factors like the anticipated contingency, cognitive resources, or (reward-)structures of the environment facilitate sampling and integration of representative co-occurrence information.

On the stability and malleability of ignoring group-level effects

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Co-operation and group-serving behaviour of group members has increasingly been acknowledged as essential to the flourishing of groups in general and the success of teams in organizations or companies in particular. Studying this, however, presupposes dissociating individual-level and group-level effects (involving a Simpson's Paradox). We have started investigating settings where true individual- and group-level effects could be dissociated in a learning paradigm concerned with individuals in changing teams. Our results show that participants often evaluated the overall most effective group-serving team-player much more negatively than all less effective non-interacting workers. This suggested a potential Tragedy of Personnel Selection, when personnel managers, relying on number-based outcomes, tend to ignore even strong and crucial group-level effects of team-players. Here we briefly summarize some new experimental findings, where we tried to improve participants' ability to dissociate individual- from group-level effects, by explicitly providing them with hypotheses about a team player. The results show at least some maleability of the previously suggested ignorance for group-level effects. This suggests that in situations with strong group-level effects and a similar structure, explicitly monitoring for team players, or perhaps group-level effects generally, may be an almost necessary prerequisite for finding them.

On theory construction in psychology: How to measure the empirical adequacy of a theoretical prediction

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Theory construction in psychology often proceeds purely subjectively. It may therefore not always offer valid explanations of social phenomena. When constructing a theory, researchers must quantify how empirically adequate a theoretical prediction is given observations. To date, however, no uncontroversial measure is available that quantifies the similarity between theory and observation. To close this gap in the literature, we

introduce the similarity index (ISIM) as a ratio of a theoretically predicted effect to an observed effect. We also show that effect size measures such as Cohen's $d = (m_1 - m_0)/s$ are ill-suited for this task because they conflate theory evaluation with statistics. Particularly the inductive statistical parameter s remains non-informative for theory evaluation. The ratio of mean difference to standard deviation yields a standardized score that is useful for theory construction, only if independent studies employ it as a (empirically adequate) theoretical prediction. We here demonstrate the added value of using ISIM in a series of simulation studies where $s = 1$, and the similarity-interval [0.80;1.20] is a two-sided threshold for an empirically adequate prediction. Simulations are performed in varying combinations of sample size ($n_0 = n_1 = 20$ to 1,000) and means in control and experimental group (m_0, $m_1 = 0.00$ to 2.00), whereby individual observations are drawn from t-distributions. This procedure is repeated 10,000 times for each combination (see https://osf.io/rgwsp/). Results show that, if $m_0 - m_1 = 0.50$ (or 1.00) and if $n_0 = n_1 = 100$ (or 1,000), then 95% (or 99%) of ISIM-values lie within this interval. Results thus support ISIM and the similarity interval as tools to measure, and to improve, the empirical adequacy of a theoretical prediction.

Origami folding: Hierarchical sequence learning of first step and inter-steps with practice

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The acquisition of sequential skills through practice is a fundamental ability of human activities, otherwise even simple tasks such as getting dressed would require a large amount of attention each time. Most studies on sequence learning used simple stimuli, such as pressing certain keys (e.g., Schumacher & Schwarb, 2009). However, a more fine-grained approach, targeting how the sequences are learned in a hierarchical sequence task, is lacking so far. We used an Origami folding task as the sequential learning task. Participants ($N = 87$) folded one out of five figures in four trials (i.e., each trial is a repetition of folding a figure). The results showed that there were significant improvements from trial 1 to trial 4 among all figures. Interestingly, the processing time for the first step was much longer than the inter-steps among all five figures, which may be due to the pre-programming of the sequences. Fluctuation in the inter-steps decreased with increased practice. As trial 4 was significantly faster than trial 3, sequence learning had not yet reached automation (ceiling effect). Further studies should thus test the influence of more additional practice sessions on sequence acquisition of a hierarchical sequence task.

Overcoming inequality: Positive deviants and resistance to cognitive bias

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Positive deviants are individuals from disadvantaged circumstances who outperform typically negative average outcomes for their group. Research on positive deviance in behavioral sciences is scarce, although such information could provide valuable insights into overcoming inequalities useful for developing interventions. In this study, we are testing choice patterns between positive deviants, low-income individuals, and the general population. Our aim is to investigate whether positive deviants perform differently on cognitive bias tasks compared to other individuals with low incomes or the general population. The instrument will be tested in multiple countries to determine potential differentiation based on systematic, social, and structural factors. This will assist with understanding potential systemic barriers or facilitators that impact outcomes for those who demonstrate optimal choice patterns, while also providing details on the generalizability of the findings.

Partner preference in motion: Using movement cues to choose interaction partners

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Many of our social interactions are supported by an ability to understand a co-actor's intentions from features of their instrumental movements (Cavallo et al. 2016). It is well established that this ability allows actors to predict how each other's movements unfold in space and time, thus supporting interpersonal action coordination (Sebanz, Bekkering & Knoblich, 2006). However, it is not yet known whether an actor's movements when responding to a social dilemma can provide us with information about their social preferences, such as whether they are cooperative or selfish. Specifically, given that knowing who to cooperate with and who to avoid is important for navigating a social interaction (Barclay & Willer, 2007), can people use cues from an actor's movements when responding to a task involving a social dilemma to decide whether they would like to cooperate with that partner on the same task? We animated virtual actors responding to three classic social dilemmas (prisoners dilemma, stag hunt, ultimatum game) which were adapted so that actors were required to respond by moving their mouse towards either the prosocial or the selfish option. These actors responded with either straight and steady movements, reflecting a confident decision or convoluted and jittery movements, reflecting a hesitant decision (Kieslich & Hilbig, 2014). We found that participants preferred to interact with actors who made prosocial choices with confident movements compared to those who made prosocial choices with hesitant movements. This also depended on the relative stakes of the prosocial and selfish choices (i.e., the payoff matrix). We discuss our findings in relation to how action understanding mechanisms may allow us to align with reliable cooperators and avoid potential free-riders.

Pay one or pay all? The role of incentive schemes on younger and older adults' decisions

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This research addresses how younger and older adults' decisions are affected by the way in which motivational incentives are provided. We compared two common incentive conditions in decision making: pay one (only a random subset of the decisions is incentivized) and pay all (incentives across all decisions are accumulated). 147 younger ($M = 25$ years) and 139 older adults ($M = 70$ years) participated in either a pay-one or pay-all condition and made binary choices between two-outcome monetary lotteries in gain, loss, and mixed domains. We analyzed participants' decision quality, and risk taking. Sensitivity to outcomes and probabilities, loss aversion, and choice sensitivity, were measured with computational modeling of cumulative prospect theory. Decision quality and risk aversion were higher in the gain than mixed or loss domain, but the age groups did not differ in these variables. Computational modeling showed that older adults' loss aversion was higher and choice sensitivity lower than younger adults'. In the pay-one condition, the individual value functions were more strongly curved and choice sensitivity was higher than in the pay-all condition, consistent with the notion that people in pay-one scenarios view decisions as more consequential, which may induce cautiousness. The findings suggest that an opportunity of accumulating incentives may have similar portfolio effects on younger and older adults' decision making and that the impact of different incentive structures should be carefully considered in aging and decision research.

People's reported willingness to help robots

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Society is increasingly using technology in everyday life, including robots. In turn, the chances of people meeting a robot in an unusual situation also increase. For example, would people be willing to help a robot that has trouble going over an elevated sidewalk? And what variables would contribute to people's willingness to help? To explore this matter, an online study aimed at $N = 312$ is being prepared (pre-registered at https://aspredicted.org/12N_2XK). Participants read 9 different scenarios from 3 domains (delivery, service industry, medical) in which an encountered robot needs help. Each scenario appears two times, in random order, followed by one of two possible visual stimuli: a humanoid or a machine-like robot. Participants decide if they would help the robot in each scenario. Attitude towards robots, knowledge (using a new robot knowledge test), and anthropomorphism are measured. The latter variable is measured using the Waytz instrument (2019) and manipulated in the experimental run using the 2 types of stimuli mentioned above. We will analyze how attitude, knowledge, and anthropomorphism relate to people's helping behavior computed as the proportion of help responses and the response time. Based on literature, we expect a high knowledge score to lead to low helping scores. On the other hand, a high anthropomorphism score and positive attitude

are expected to relate to a higher helping score. We expect the humanoid robot to evoke more help responses as the machine-like one. Understanding the variables that contribute to people's willingness to help robots is relevant for a successful integration of robots into our society. Plus, understanding people's decision about helping robots or not can shed further light on how people mentally categorize robots.

Perceived naturalness of emotional voice morphs

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Technical advances in voice morphing software offer novel research perspectives to the field of vocal emotion perception. However, some parameter-specific morphing manipulations may lead to profound acoustic distortion, potentially making resynthesized voices sound unnatural and less human-like. To date, it is poorly understood how the impression of naturalness is formed, how perceived naturalness may be affected by different voice manipulations, and how it interacts with the perception of other signals such as vocal emotions. To investigate these issues, we conducted a rating study on perceived naturalness and emotionality of voice morphs expressing different emotions through isolated acoustic parameters only, while others were held constant on an emotionally non-informative level. Inspired by previous research on the acoustic determinants of naturalness, we compared two different morphing approaches, using either neutral voices or emotional averages as references, which contribute the emotionally non-informative portion of the stimuli. As expected, parameter-specific voice morphing affected perceived naturalness. Importantly, this could be influenced to a certain degree by the choice of the morphing reference, since the reduction of naturalness was more comparable in the parameter-specific voice morphs which used emotional averages as reference. Crucially, there was no relationship between ratings of emotionality and naturalness, suggesting that the perception of emotion was not substantially affected by a reduction of voice naturalness. We hold that while these findings advocate parameter-specific voice morphing as a suitable tool for research on vocal emotion perception, they also highlight that one should be conscientious in producing ecologically valid stimuli.

Perceptual grouping in the context of complex action control

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According to current action control theories, individual responses are represented via short-term memory units called event files (Hommel et al., 2001; Frings et al., 2020) that have been described as loose networks of bindings between stimulus, response, and effect features (Hommel, 2004). Thus, responses are at least partly represented by (response relevant) stimuli and following effects. Recently, it has been shown that individual responses can also enter bindings with other responses (response-response bindings, Moeller & Frings, 2019). That is, two sequential responses can be integrated so that repeating one of them later on retrieves the other, influencing further responding. These binding

effects are smaller for responses executed by different hands that are positioned far apart than by hands positioned close together. Here we analyzed whether the distance between target stimuli or effects of responses affected bindings between the responses in a similar way. In two experiments, using a response-response binding paradigm, we either grouped the effects elicited by to be integrated responses ($N = 30$) or the target stimuli that participants responded to ($N = 40$). Results indicate that grouping of stimuli and of effects influenced response-response binding differently. Possible indications for the ideomotor principle in the context of binding and retrieval are discussed.

Perceptual hysteresis effects in the stream/bounce display

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The present study investigated if the localization of visual objects in the stream/bounce display (SBD) was affected by perceptual hysteresis. In the SBD, two objects that move towards each other, overlap, and return to their initial positions can be perceived as either streaming through or bouncing off each other. The bias towards a bouncing percept increases (1) with object distance and (2) with presentation of a tone at the moment of maximum overlap. For a different percept, orientation, a marked hysteresis effect has been demonstrated: in an orientation judgment task, current perception is affected by the previous judgments. In this study, we asked participants ($n = 45$, $M_{\text{age}} = 24.2$, 25 females) to judge whether objects appeared to stream through or bounce off each other. Object distance at the moment of maximum overlap was varied in ordered (increasing/decreasing) sequences. A unisensory and a multisensory condition (without/with tone) were presented. If perception in the SBD was affected by hysteresis, we expected persistence in a bouncing percept in decreasing sequences and in a streaming percept in increasing sequences of distances. A repeated measures ANOVA on the point of subjective equality showed a main effect of sequence 'order', $F(1, 44) = 15.516$, $p < .001$, $\eta^2 = .048$, a main effect of sensory 'condition', $F(1, 44) = 11.653$, $p = .001$, $\eta^2 = .024$, but no interaction of 'order' and 'condition', $F(1, 44) < 1$, $p = .328$, $\eta^2 < .001$. Participants persisted in their initial percept (stream/bounce) in the ordered sequences, indicating a perceptual hysteresis effect in the SBD. In the multisensory condition, perception was biased towards a bouncing percept. The lack of an interaction indicates that the visual hysteresis is unaffected by multisensory integration.

Performance increase following fatigue intervention in modality-specific dual-task situations despite subjective fatigue

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It remains elusive to which extent the underlying mechanisms of modality-specific dual-task costs in the comparison of modality compatible and modality incompatible stimulus-

response mappings are the same. Differential dual-task-specific demands for modality incompatible mappings may be related to the binding strength of stimulus-response mappings or the shielding from competing task sets due to potential crosstalk. Similar to the idea of transfer of cognitive training effects, we aimed to induce mental fatigue to identify potential overlap of the mechanisms at work between modality compatible and incompatible mappings in a series of (pilot-) experiments. We expected to find a decline in dual-task performance, where the modality-incompatible mapping should be more vulnerable to the effects of a cognitively demanding fatigue intervention compared to the modality-compatible mappings. We tested this in 61 participants in 3 separate (pilot-) experiments with a Pre-Post design including an 80-90min fatigue intervention with different tasks per experiment. Pre and Post sessions for all experiments contained single and dual tasks in both modality mappings. In addition to behavioral performance measures, subjective items were used to assess the feeling of fatigue. Despite the consistent report of increased fatigue in all experiments, mean dual-task performance after the intervention indicates a training effect instead of the presumed fatigue effect, which was more prominent for the modality incompatible mapping. This dynamic interplay of training and fatigue with an asymmetric transfer effect on the modality mappings suggests that high control demands are separable from the demands involved in modality-compatible dual-task performance.

Performance of Bayes factor approximations for comparing nested hierarchical SDT models

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The Bayes factor is a powerful tool to test hypotheses and select among competing models. In particular, its principled penalization of model flexibility makes it ideally suited to select among theoretically motivated cognitive models. These models often feature nonlinearity and non-orthogonal model parameterization, which complicate the quantification of model flexibility. Unfortunately, these same features of cognitive models typically prohibit the expression of the marginal likelihood, a quantity required for the calculation of the Bayes factor. Two popular approaches to overcome this problem approximate the Bayes factor using Monte Carlo methods: The Savage-Dickey ratio and bridge sampling. The Savage-Dickey ratio is computationally cheap but its application is limited to nested model comparisons; bridge sampling can be used to compare any set of models but is more computationally expensive. To further explore their respective benefits, I compare each method's performance for nested model comparisons of hierarchical signal detection models applied to empirical data from an image recognition experiment.

Personal task choice immunizes against incidental affective influences on effort

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Two experiments tested whether engaging in actions by personal choice vs. external task assignment moderates the effect of incidental affective stimulation on effort—a central aspect of action control and volition. As choice of an action alternative has been found to lead to strong goal commitment, an implemental mindset, and determined task focus, we reasoned that it should shield actions execution from incidental affective influences in terms of happy vs. sad background music. By contrast, external task assignment should lead to weaker action shielding and thus give way to incidental affective influence that have been found in several studies on affective influences on effort. Results followed our predictions. When participants were assigned the cognitive task, happy music led to lower effort assessed as performance-related cardiac pre-ejection period responses in an easy task (Study 1) and higher effort in a difficult task (Study 2) than sad music. Importantly, these music effects on volition did not appear among participants who could ostensibly choose the type of task themselves (in fact, all participants worked on the same short term memory tasks). Our results show that working on a task is shielded better from incidental affective influences when the task is personally chosen rather than externally assigned.

Place-name categorisations affect wayfinding behaviour

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Regionalisation is the grouping of places into regions. It has been shown to affect spatial reasoning in path planning: when choosing the shortest route to a goal where two equidistant routes exist, humans prefer the route with less interregional border crossings (Region dependent route preference, RDRP). Perceived regionalization depends on the semantic and contextual similarity of landmark objects, but may also be induced by place names. However, in this case only by contextual similarity. Here we address the role of place name semantic similarity in wayfinding in a ring-shaped maze with 12 places, numbered 1-6 in the ring, each with an attached dead end. Places were marked by object names allowing two possible categorizations resulting in different regions (either places 1-2, 3-4, 5-6 or 2-3, 4-5, 6-1, each with their attached dead end). Prior to the wayfinding task, subjects were asked to categorize the landmark names into three groups of four, and thereby discovered one or the other categorization. We tested whether subjects show RDRP and whether RDRP changes depending on the previously discovered categorization. In the test phase subjects were asked to take the shortest route between three places. Half of the tasks could be solved by taking either of two equidistant routes. The routes differed however in that depending on the previous categorisation one route will lead to more border crossings between regions than the other. We found that subjects show RDRP according to their previous categorization. Therefore, place-names grouped into semantic categories can evoke a significant regionalisation. Also, the regionalisation effect can lead to different orientation behaviours even within the same environment.

Please ignore this: Early visual cortex and precuneus activation as neural correlates of distractor preparation in negative cueing

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Selecting relevant from irrelevant input enables us to act in a sensory rich environment. This attentional filter includes target facilitation and distractor rejection. Distractor foreknowledge can facilitate visual search, yet the neural mechanism is unclear. Does working memory store distractor features as "templates for rejection" biasing attention away from them (Woodman & Luck, 2007), or are they attended before being rejected, according to the "search and destroy" theory (Moher & Egeth, 2012)? As most negative cueing studies used color stimuli, we also asked if their findings generalize to shapes as feature conjunctions. Two samples of twenty-five healthy humans participated in two fMRI studies, with the first one presenting a distractor shape cue, a target cue, and a task-irrelevant control condition in a randomized order, and the second one presenting the conditions in a blocked way to control for top-down inhibition due to task-set changes. Both experiments showed early visual cortex pre-activation with distractor- compared to task-irrelevant cues, in line with spatial and implicit distractor preparation paradigms. Precuneus activation distinguished distractor- from target preparation, against the "search and destroy" assumption that distractors are represented like targets before search. We confirmed a negative cueing effect for shapes, yet its neural signature differed from that for colors (Reeder, Olivers, & Pollmann, 2017), suggesting that the underlying mechanism depends on stimulus complexity.

Potential effects of a frontal brake light on pedestrians' willingness to cross

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The number of pedestrian casualties in crashes with motorized vehicles is worrying. Pedestrians' misinterpretations of the vehicle's behavior are considered to be a contributing factor. A frontal brake light, which communicates that a vehicle is decelerating, could be a simple approach to support the interpretation of vehicle behavior. Notably, the brake light's message ("I decelerate") holds true for every observer and remains functional in complex scenarios. So far, it has proven to facilitate the identification of decelerations considerably (Petzoldt et al., 2018). In a next step, in order to assess a potential effect of a frontal brake light on pedestrians' willingness to cross, the authors have conducted a video-based lab experiment. In a two-group randomized study, videos of vehicles approaching with either 50 km/h or 30 km/h were shown to the participants, who observed the scenarios from the position of a pedestrian standing at the curb. The videos either displayed yielding or non-yielding behavior. In case of yielding behavior, the vehicle began to decelerate either 55m or 32m away from the pedestrian and came to a full stop at the pedestrian's position. In one of two participant groups, the vehicle was equipped with a frontal brake light. Participants were asked to indicate their willingness to cross the

street in front of the approaching vehicle at different distances. We expected to observe a dominant effect of the vehicle's behavior (yielding/non-yielding) on willingness to cross and, in case of yielding behavior, an overall higher willingness to cross in front of the vehicle equipped with the frontal brake light. Results will be reported. Implications for the development of eHMIs will be discussed.

Predictability does not increase separation of dual-task representations

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A common finding in dual-task research is that pairing a serial reaction time task involving a sequence with a randomized task leads to reduced implicit learning of the sequence. Previous studies showed that across-task predictability plays a role in the acquisition of sequence knowledge, possibly due to a better separation of task representations. A higher predictability for one of the tasks should then lead to higher separation of task representations and thus to less mutual interference between the two tasks. Here we investigated the role of within-task predictability in the separation of task representations by looking at the amount of dual-task interference, measured by the response time difference between frequently occuring stimulus pairings and rarely occuring stimulus pairings. In four experiments we introduced opportunities to use predictability to separate the task representations of two tasks with frequent and infrequent stimulus pairings. We introduced either stochastic or fixed, pattern-based predictability. The latter was also combined with a greater separation of stimulus and response modes and a preceding training of the predictable task as a single-task . The predictability manipulations improved performance, but the difference between frequent and infrequent pairings did not diminish, increasing within-task predictability did not reduce the amount of dual-task interference. Either within-task predictability does not cause task separation or the the assumption that task separation reduces interference was incorrect. The results can be seen as supporting an automatic view of the encoding of across-task instances over a selective and strategic view: Co-occuring events are encoded together, even when it would be beneficial to encode them separately.

Preference for symmetry: From Fechner to modern empirical aesthetics

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University of Vienna

Almost 150 years ago, Gustav Theodor Fechner acknowledged the fact that symmetry is generally preferred over asymmetry. More specifically, he proposed that preference is not proportionally decreasing with deviation from symmetry. Instead, he assumed that as soon as the deviation is big enough to be recognized, it will cause a strong decrease of preference. This is exactly what we found in a first study: Abstract patterns showing small random deviations from symmetry (broken patterns) were profoundly less liked than

symmetric patterns. However, researchers from Bertamini Lab have found a more linear relation between proportion of symmetry and preference, which could be due to a different way of constructing levels of symmetry in stimulus patterns. With these conflicting results, the influence of deviations from symmetry on liking was still unclear. Therefore, in another study using Fechner's method of production, we instructed participants to change abstract patterns randomly deviating from symmetry (broken patterns) to improve their aesthetic appeal without making them symmetric. A follow-up rating study showed that the improved patterns were almost as liked as symmetric ones. In addition, they were also rated much more interesting than symmetric patterns. Furthermore, there are also large individual differences. In a recent study, we compared art experts with laypersons and found no difference in liking or interestingness between symmetric and asymmetric patterns for art experts. Thus, we could only partly confirm Fechner's original statement about the negative effect of deviations from symmetry on preference. It seems to be correct for laypersons and random, clearly visible, focal deviations, but not necessarily for intentional, balanced deviations or art experts.

Preferences for intuition and analysis: Who, when and why?

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People differ in their preferences to make decisions in a more intuitive or analytic manner. Despite evidence of reliable individual trait-like differences in intuitive and analytic styles, research has recently provided evidence for different ad hoc preferences for intuitive and analytic decision-making as a function of context characteristics. One of such characteristics is choice complexity. Evidence shows that choices that are perceived as complex elicit a greater preference for choosing analytically as opposed to intuitively, and choices that are perceived as simple elicit a greater preference for choosing intuitively as opposed to analytically (Inbar et al., 2010). Here, we test the direct and interactive effects of choice complexity and decision-makers' cognitive styles on explicit preferences for intuition and analysis (Study 1). Furthermore, we examine the role of perceived validity of intuition and analysis as mechanisms underlying such preferences (Study 2). Overall, results from both studies evidenced consistent explicit preferences for intuition in simple choices (purchase decisions of simple products) and analysis in complex choices (purchase decisions of complex products). Additionally, preferences for intuition (/analysis) were higher among more intuitive (/analytic) participants. Results from Study 2 provided evidence that individual differences in perceived validity of intuition and analysis mediated the effects of cognitive styles on preferences for intuition and analysis, being this effect clearer for complex choices. Taken together, these data suggest that both contextual features and individuals' cognitive styles influence preferences for decision-making strategies, which are partially guided by the perceived validity of such strategies.

Probing sensory attenuation for self-initiated actions using virtual reality

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Self-generated outcome is perceived as less intense than the same sensory input generated externally. This phenomenon, called Sensory Attenuation (SA), is often explained by motor-based forward models. Recent developments in the research of SA, however, challenge these models. Using Virtual Reality in an adapted study design (Vasser et al., 2019), we aimed to examine the abilities of motor-based forward models and predictive processing in explaining SA. Participants decided about the intensity of Gabor contrasts, which either appeared behind participants' virtually invisible moving hand or not. Further, we examined the influence of temporal predictability and identity prediction by externally manipulating stimulus onset time and the initiation of motor behavior. Stimuli either appeared immediately after motor-behavior, with a varying delay or independent of the participants' actions. We assessed differences in contrast perception by analyzing variations of the point of subjective equality (PSE) depending on the different conditions. Preliminary data analysis shows that our results partly reproduce and extend the findings reported by Vasser et al. (2019), favoring predictive processing over motor-based forward models to explain the collected results.

Probing the spatial power of numbers – evidence from temporal order judgements

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Using detection tasks with speeded responses, previous research has shown that number perception can cause shifts of covert attention depending on number magnitude and experimental context (e.g., the task relevance of numerical stimuli). Here, we will present the data from two behavioral experiments using a temporal order judgement (TOJ) task. In two separate blocks, participants were instructed to verbally report which of two geometric target stimuli ("bo" for square, or "ba" for diamond) was presented first or last, respectively. Target stimuli were presented left and right of fixation, with stimulus onset asynchronies (SOAs) ranging between 12 and 71 ms. Prior to the targets, symbolic numbers 1 or 9 were presented as central attentional cues. To measure the strength of the temporal bias induced by each number, we fitted logistic regression models to the individual relative frequencies of "left-first" TOJ responses as a function of SOA. In the first experiment ($N = 24$), in which the symbolic number was irrelevant to the participants' task, we observed a small mean temporal bias in the unpredicted direction which was not different from chance. In the second experiment, participants were also required to verbally report the symbolic number in 30% of trials. Preliminary data show a mean temporal bias in the predicted direction and within the range of previously reported temporal biases (6 ms). We will discuss our data with respect to the extent and boundary conditions of number-induced attentional biases, which lie at the heart of understanding

the coupling between number processing and spatial cognition.

Procedural, conceptual, and practical aspects of the propositional evaluation paradigm

Jamie Cummins
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The Propositional Evaluation Paradigm (PEP) is an exciting and novel implicit measure which may overcome many of the issues associated with other implicit measures. In this talk, I will discuss a number of research findings using the PEP with regard to procedural, conceptual, and practical investigations into the task. At the procedural level, I report studies which compare response-time- and mouse-tracking-based versions of the task along a number of criteria. At the conceptual level, I discuss studies relating to the ability of the PEP to capture and reflect propositional/relational information. Finally, at the practical level, I discuss some best practices, advantages, and barriers for the use of the task in online and lab-based research.

Process accountability's potential to improve judgement and decision quality seems to be less robust than previously thought. An attempt to replicate the effect of (process) accountability on loss aversion in 3 studies

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Previous research has shown that accountability reduces loss aversion (Vieider, 2009), but no attempt has been made yet to differentiate this effect into process and outcome accountability – a distinction that has been shown to be vital for the effects of accountability on judgements and decisions. We aimed to close this gap and extend the original findings by disentangling the two types of accountability. However, we were unable to do so, as over a series of three experiments we could not replicate the original effect of accountability on loss aversion. In Studies 1 ($N = 127$) and 2 ($N = 90$) participants were randomly assigned to one of three conditions: no accountability, process accountability or outcome accountability. Otherwise we employed the same task and experimental procedure as Vieider but were unable to replicate the effect of accountability on loss aversion as a Kruskall-Wallis test did not show any significant effects of experimental condition (Study 1: $\chi^2 = 0.19$, $p = .91$; Study 2: $\chi^2 = 2.26$, $p = .32$). After our first two studies failed to replicate Vieiders results, our focus shifted towards a full-on replication attempt. Thus, for our third study ($N = 183$) we again used the same task and procedure as Vieider but this time removed the outcome accountability condition and applied Vieiders original accountability manipulation as closely as possible. However, we still were unable to replicate the original finding, as a Wilcoxon rank-sum test did not show significant differences in loss aversion between accountable and non-accountable participants ($W = 4{,}514$, $p = .32$). While our findings do not fully rule out that (process) accountability

affects loss aversion, they strongly indicate that this effect, if it exists, is less robust than previously thought.

Producing deceptive actions in sports: The costs of generating head fakes in basketball

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Typically, head fakes in basketball are generated to deteriorate performance on the side of the observer. However, little is known about the potential costs at the side of the producer of a fake action. Here, we studied such head-fake production costs. Participants were asked to either generate direct passes or head fakes. The required actions were cued by a visual stimulus with an interstimulus interval (ISI) of either 0ms, 400ms, 800ms or 1200ms in advance of the request to actually carry them out. We observed higher reaction times (RTs) for head fakes as compared to direct passes for no and an intermediate preparation interval (ISI: 0ms, 400ms and 800ms) but not for the long preparation interval (ISI: 1200ms). Results of the present study suggest that generating fake actions produces performance costs, however, these costs can be overcome by a longer preparation phase before movement execution. In a current follow-up experiment we studied whether extensive practice over 5 consecutive days could reduce the performance costs of the head fake. As stimulus-response associations are well known to be strengthened by practice up to a level of conditional automaticity we expect that enough practice could reduce or even eliminate the production cost of head fakes in basketball.

Quantifying cognitive decline in the absence of external glucose sources – proposing a link between human feeding behavior and glucose homeostasis

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Quantifying cognitive decline in the absence of external glucose sources – proposing a link between human feeding behavior and glucose homeostasis. Existing evidence on effects of glucose supplementation on cognitive performance appears inconclusive. Metabolic switching may offer an approach towards explaining such incoherent findings based on differences in cognitive functioning after fasting. We propose a new construct, cognitive glucose sensitivity (CGS), which quantifies stable individual performance gain due to glucose supplementation. We tested the hypothesis that effects of glucose ingestion may depend on CGS, cognitive task domain, and sex. Additionally, the relationship between CGS and Body Mass Index (BMI) was examined. Seventy-one participants (48 female) were tested in two conditions each (deprivation baseline vs. glucose supplementation), performing tasks from different cognitive domains (memory and executive functioning). We found significant evidence for a correlation of deprivation baseline and CGS across domains (Corsi-Block-Tapping-Task: $r = -0.57$, $p < .001$; Go-No-Go Task: $r = 0.39$, $p = .001$; word list recall: $r = -0.50$, $p < .001$). Moreover, individual CGS differed

significantly between tasks ($p = .018$). Only in men, BMI was significantly related to CGS in a word recall paradigm ($r = .49$, $p = .017$). Our findings confirm that effects of glucose depend on CGS, task domain, and sex. Therefore, CGS can contribute to the understanding of the etiology of unhealthy eating. The effort to reduce performance impairment (short-term) might sacrifice independence from external glucose (long term), possibly via compromised blood glucose regulation.

Reaktionen manueller Fahrer auf den wiederholten Kontakt mit Level 3 Fahrzeugen im Mischverkehr auf der Autobahn

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In naher Zukunft werden neben manuellen Fahrern (SAE Level 2) auch hochautomatisierte Fahrzeuge (SAE Level 3) auf der Autobahn unterwegs sein. Daraus resultiert ein Mischverkehr, in dem manuelle Fahrer diesen Fahrzeugen zunehmend begegnen. Bislang ist jedoch unklar, wie manuelle Fahrer auf diese Fahrzeuge reagieren, wenn sie gemeinsam im Mischverkehr über längere Autobahnabschnitte interagieren. Dazu wurde eine Fahrsimulatorstudie durchgeführt, bei der Probanden vier Abschnitte (jeweils 35 km lang) mit unterschiedlichen Durchdringungsraten automatisierter Fahrzeuge (0%, 25%, 50%, 75%; Innersubjektfaktor) im Mischverkehr absolvierten. Zusätzlich wurde die Wirkung der Außenkennzeichnung des automatisierten Fahrmodus mittels eHMI untersucht (kein eHMI, eHMI als Statusanzeige, Kontrollgruppe ohne Informationen über den Mischverkehr; Zwischensubjektfaktor). An der Studie nahmen $N = 51$ Probanden im Alter von 22 bis 74 Jahren (22 weiblich) teil. Nach jedem Fahrtabschnitt bewerteten die Probanden den vorangegangenen Fahrtabschnitt hinsichtlich erlebter Sicherheit, Komfort, Effizienz und sie schätzten den Anteil an automatisierten Fahrzeugen ein. Zusätzlich wurden minimale Sekundenabstände zu vorausfahrenden Fahrzeugen sowie die Durchschnittsgeschwindigkeiten der Probanden ausgewertet. Insgesamt bewerteten Probanden das Fahren im Mischverkehr zwar als unangenehmer als im manuellen Verkehr, aber im Mittel nicht als gefährlich. Eine Statusanzeige ist empfehlenswert, da Fahrer das eHMI als visuellen Hinweisreiz nutzen, um automatisierte Fahrzeuge auf längeren Autobahnabschnitten zu identifizieren. Bereits ab einem Anteil von 25% automatisierten Fahrzeugen sanken die Durchschnittsgeschwindigkeiten der Probanden, aber auch die Sekundenabstände zu vorausfahrenden Fahrzeugen.

Reduced attention to faces in images is associated with psychopathology

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Humans show a robust tendency to attend to faces in images, but also differ consistently in the strength of this attentional preference. Previous research remained inconclusive as to how a stronger attentional preference for faces may be indicative of an individual's personality or clinical characteristics. Participants differed consistently in the strength

of their attention to faces across images (Cronbach's $\alpha = .88$). A stronger preference for faces was correlated positively with openness to experience, extraversion, agreeableness and empathizing and was correlated negatively with social anxiety, depression levels and alexithymia. A dominant common factor, which may be best understood as general psychopathology, was correlated with attention towards faces at $r = -.36$. Social anxiety stood out as only variable which explained attention towards faces above and beyond the Big Five personality factors. We compare these results with previous studies to assess the generalizability of social attention between laboratory and real-life situations and to discuss a possible bridging role of virtual reality.

Reduced working memory resources affect aesthetic experiences

Rosalie Weigand & Thomas Jacobsen
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Do we savour aesthetic experiences less when distracted by interrupted tasks, work rumination, or stress? Evidence suggests that the ability to concentrate on the aesthetic experience is crucial for initiating a processing mode of conscious aesthetic reception that results in more positive emotions. When working memory resources are otherwise occupied, people are less able to concentrate on aesthetic experiences. We conducted three investigations to examine how conditions that are known to deplete working memory resources affect the savouring of aesthetic experiences. In a controlled laboratory setting, participants rated beauty and savouring felt from encounters with visual stimuli after an interruption of a writing task. Aesthetic experience was hampered if participants were interrupted. In two field investigations, we demonstrated that work-related rumination and stress are inversely related to the savouring felt from opera, theatre, or cabaret pieces. These findings highlight the importance of concentrating on aesthetic experiences so that the perceiver can fully benefit from them.

Remedying the metamemory expectancy illusion in source monitoring: Are there effects on restudy choices and source memory?

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In source monitoring, schema-based expectations bias metamemory monitoring and control (Schaper & Bayen, 2021). Source memory is better for unexpected than expected sources (e.g., "hairdryer in the kitchen" vs. "oven in the kitchen", inconsistency effect). However, people predict the opposite: They show an expectancy illusion. This illusion biases restudy choices. Participants prefer to restudy unexpected source–item pairs, even though source memory is already quite good for these pairs. In the current study, we aimed to remedy the expectancy illusion (Schaper et al., in press) and debias restudy choices by implementing a delay between study and metamemory judgments. We further asked whether debiased restudy choices enhanced source memory for expected pairs,

thereby reducing the inconsistency effect. Two participant groups ($n = 72$ each) studied expected and unexpected source–item pairs. They provided metamemory judgments and selected pairs for restudy either at study (immediate) or after a delay (delayed). They then restudied the selected pairs and completed a source-monitoring test. The immediate group predicted better source memory for expected pairs and selected more unexpected pairs for restudy. The delayed group predicted a null effect on source memory, and selected equal numbers of expected and unexpected pairs. Thus, delaying judgments partially remedied the expectancy illusion in metamemory monitoring and debiased metamemory control. Despite differential restudy choices, both groups showed equally strong inconsistency effects on source memory. Debiasing metamemory monitoring and control via delayed judgments only weakly affected source memory.

Removal of information from working memory: A new approach to measure removal time

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Removal of outdated information from working memory (WM) is an essential process to keep WM free for new content. To examine or to manipulate this special process, most previous studies isolated this process by cuing the to-be-removed items before presenting the new stimulus. In this study, we designed a no pre-cue WM updating paradigm to separate the removal process from the encoding process. In Experiments 1 and 2, we manipulated the need to remove an old item during updating items in WM. In one condition, participants were asked to replace old items by new items. In another condition, they only needed to encode new items into WM. The difference in response times (RT) to new items provides an estimate of the duration of removing an old item from WM. In a third condition (Experiment 2), we isolated the removal process by asking participants to just remove items from their WM without replacing them by new items. Participants' RTs for replacing old items by new items was longer than RTs for only encoding new items into WM, or for only removing old items from WM. In addition, when we asked participants to retrieve to-be-remembered items after replacing or removing old items, there was still a small tendency for them to recall these old items. The tendency to recall old items was found equally for tests of updated and not updated items, suggesting that memory for old items remains in WM, but is no longer bound to their list position. Taken together, the results support that removal of outdated information from WM is a specific updating process. During this process, item-context bindings are removed from WM, but the outdated items might still remain in WM in an unbound fashion.

Repetition impacts believing more in neutral than emotional statements

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The truth effect may contribute to the credibility of fake news. Statements to which

people are exposed in social media may be accepted as true simply due to its increased fluency. Because most social media information stream affect-laden content, we set out to check whether the affective value of the information would interfere with the effect of previous exposure. In the three experiments with the same baseline paradigm, participants first assessed the level of interest of a set of neutral, emotional statements; then they performed a distractor task; they assessed the perceived truth of familiar and unfamiliar sentences; and finally, they are asked to perform source recognition judgments for each of the statements. Experiment 1 addressed the hypothesis with general affective statements and Experiment 2 compared statements that activated a different set of emotions (disgust, fear, anger, sadness, happiness). Experiment 3 addressed how the emotionality of a sentence interferes with the perceived likelihood that a statement is false if it contradicts the content of the information they were previously exposed to (falseness effect). The results show that, in general, familiarity with emotional statements is less likely to create an illusion of truth, but more likely to create a falseness effect than familiarity with neutral statements. The presented analyses test the contribution of an expected deeper encoding of affective information to these effects, and the discussion of the results is done in light of the reference theory of truth (Unkelbach & Rom, 2017).

Repetition of moral transgressions decreases their perceived moral wrongness

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A prominent notion in moral psychology holds that people rely primarily on their intuitions when judging whether a behavior or issue is morally right or wrong (Haidt, 2001). Moreover, research in cognitive psychology has shown that feelings of processing fluency affect a variety of judgments such as pleasantness and truth. In two pre-registered online experiments, we tested whether processing fluency also affects moral judgments. Participants judged the moral wrongness of potential moral transgressions described in short vignettes, some of which they had already read in a previous phase of the study. Experiment 1 ($N = 201$) showed that repeating descriptions tended to decrease the perceived moral wrongness of the described situations relative to situations participants had not read about before. Experiment 2 ($N = 1,163$) assessed moral judgments and truth judgments of the situations in a between-participants design. Again, repetition led to a small decrease in perceived moral wrongness of the described situations. Yet, it did not affect the extent to which situations were perceived to be true stories. The findings suggest that processing fluency informs moral judgments and provide support for social intuitionist models of morality.

Response priming reveals a bias in trustworthiness evaluations of female versus male faces

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Using an innovative variant of the response-priming paradigm, ten Brinke et al. (2014, *Psychological Science*) seemingly found evidence for unconscious lie detection: Participants were asked to classify target words as truth-related or lie-related. These words were preceded by photographs of individuals whom the participants had previously watched being interrogated about committing a mock crime. Interestingly, pictures of those suspects who lied to the interrogator acted as lie primes and pictures of those suspects who told the truth acted as truth primes. However, a reanalysis of ten Brinke et al.'s data showed that this priming effect was most likely caused by a gender bias in facial trustworthiness evaluations. In order to further test the hypothesis that female faces are generally perceived to be more trustworthy than male faces, we conducted two response-priming experiments $N_1 = 39$, $N_2 = 61$. Participants were asked to classify target words as truth-related or lie-related. Each target word was preceded by a male or female face prime. An independent sample had explicitly rated half of these face primes as trustworthy, the other half as untrustworthy. We found that generally trustworthy faces acted as truth primes and untrustworthy faces acted as lie primes. Furthermore, within the class of trustworthy faces, female faces acted as truth primes and male faces acted as lie primes. However, this gender effect did not occur for untrustworthy faces. These results suggest that (a) spontaneous facial trustworthiness evaluations are biased by face gender and that (b) facial trustworthiness evaluations can be measured with a variant of response priming originally developed to measure unconscious lie detection.

Response-effect compatibility affects performance in a web-based lane-assisted driving task

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When performing speeded choice reaction tasks, participants usually respond faster and/or less error prone when either stimulus and response and/or response and effect are consistently located on the same side rather than on opposite sides. Such spatial stimulus response compatibility (SRC) and response effect compatibility (REC) effects have not only been studied extensively in basic psychological research but might also have direct implications for human factors related concerns such as display design. In the present study, we aimed at investigating the concurrent influence of REC and SRC on performance in a lane-assisted driving task. To that end, we varied both R-E and S-R compatibility in an online, browser-based and unsupervised virtual car steering experiment; a POV 3D simulation of a cockpit view driving a car down a street was complemented by a 2D animated interactive lane assistant depicting the relative positions of car and lane marks. REC was manipulated by moving either the iconical car (R-E compatible) or the lane marks (R-E incompatible) of the virtual lane assistant

in response to participants directing the car from the side to the center of the lane. SRC was manipulated by presenting arrows pointing either in the to be moved or opposite direction, reflecting S-R compatible and incompatible conditions, respectively. Results showed faster and less error prone reactions in R-E compatible than in R-E incompatible trials, while SRC did neither influence reaction time nor error rates meaningfully. Our results strengthen previous results demonstrating REC with continuous and/or complex action effects and thus emphasize the importance of R-E compatible designs with direct implications for dynamic visual assistant systems.

Retrieval practice enhances new learning but does not affect performance in subsequent arithmetic tasks

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The forward testing effect is an indirect benefit of retrieval practice. It refers to the finding that retrieval practice of previously studied information enhances learning and retention of subsequently studied other information in episodic memory tasks. Here, two experiments were conducted that investigated whether retrieval practice influences participants' performance in other tasks, i.e., arithmetic tasks. Participants studied three lists of words in anticipation of a final recall test. In the testing condition, participants were immediately tested on lists 1 and 2 after study of each list, whereas in the restudy condition, they restudied lists 1 and 2 after initial study. Before and after study of list 3, participants did an arithmetic task. Finally, participants were tested on list 3, list 2, and list 1. Different arithmetic tasks were used in the two experiments. Participants did a modular arithmetic task in Experiment 1 ($N = 64$) and a single-digit multiplication task in Experiment 2 ($N = 64$). The results of both experiments showed a forward testing effect with interim testing of lists 1 and 2 enhancing list 3 recall in the list 3 recall test, but no effects of recall testing of lists 1 and 2 for participants' performance in the arithmetic tasks. The findings are discussed with respect to cognitive load theory and current theories of the forward testing effect.

Reviewing evidence for different representations in perception and action

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The Perception-Action Model (PAM) assumes that visual information in the human brain is processed in qualitatively different ways by dorsal and ventral cortical streams. Evidence for differential processing in the two streams comes from the Garner paradigm, that tests selective attention to stimulus features. It has a baseline condition, where only task-relevant stimulus variation occurs, and a filtering condition, where task-relevant and irrelevant variation occurs. Longer reaction times in the filtering condition compared to the baseline condition indicate Garner interference. Ganel & Goodale (2003, Nature) observed Garner interference in perception and manual estimation (both arguably based on

ventral/amodal representations), but not in a visuo-motor action task (arguably based on dorsal/modal representations). We replicated this experiment ($N = 24$) in a within-subjects design. In the perception task, participants pressed a button to judge rectangular objects as "narrow" or "wide". In the manual estimation task, they estimated the width of these objects with their finger-span. In the action task, they grasped these objects along the width. We confirmed previous findings in perception and grasping. However, we found no Garner Interference in manual estimation start time. Frequentist and Bayesian analyses of our results and a review of other, similar studies reveal inconsistencies in the literature. Hesse & Schenk (2013, Behavioural Brain Research) proposed an alternative account for Garner interference that explains our results in manual estimation, but casts doubt on Garner interference as valid evidence for the PAM. We extend this framework and assess claims of different processing and representations in the two streams assumed by the PAM.

Reward processing in overlapping dual-task situations

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In dual-task (DT) situations, performance in reaction time and errors is impaired compared to single-task situations. These performance decrements can be explained with the serial processing at the response selection stage constituting a bottleneck. Evidence for this assumption stems from the observation that response times for the second task (task 2) increase with decreasing stimulus-onset asynchrony (SOA). In this study, we investigated how and at which processing locations monetary reward processing affects participants' DT performance. In Experiment 1, we addressed two questions. First, does reward provided for task 1 performance affect task 1 performance, or does it also affect task 2 performance? To conclude whether reward affected task 1 and task 2 performance, we relied on the psychological refractory period paradigm (PRP) as a chronometric tool and the locus-of-slack technique. Second, we asked for the locus of the reward effect within the DT stream. We measured shorter RTs in task 1 in a rewarded compared to an un-rewarded condition indicating that reward affected task 1 processing. Furthermore, this reward effect propagated fully onto task 2 at short SOA but not at long SOA, which suggests that the locus of the reward effect is located before or at the bottleneck stages of task 1. In Experiment 2, we investigated onto which processes of task 2 the reward effect propagation from task 1 is operating. To this end, we implemented an additional difficulty manipulation of the response selection of task 2 and found that the reward effect is propagated from task 1 directly onto the response selection stage of task 2.

Rhythmic subvocalization: An eye-tracking study on silent poetry reading

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Our study on silent reading of conventionally metered and rhymed poetry examined to

what extend effects reflect rhythmic subvocalization and how the processing of MRRL (metrically regular, rhymed language) is influenced by a visual presentation mode. Thirty-eight participants read eight German MRRL-stimuli, with one half presented in poem layout, where verse endings coincided with line breaks, and the other half in prose layout, where verse endings often appeared mid-line. We additionally introduced 3 types of anomalies to generate an inconsistent version of stimuli, i.e., a metrical, a rhyme anomaly, and a combination of both. We predicted that the silent reading of MRRL results in generating auditive expectations based on a rhythmic "audible gestalt", induced by subvocalization of rhythmic patterns. Our results show a fairly robust pattern over all RT-measures, indicating that readers were sensitive to rhythmic-gestalt-anomalies, but differently so in poem and prose layouts. Metrical anomalies in particular resulted in increased fixation and RTs in the poem layout, as well as in re-reading of local context. Rhyme anomalies elicited stronger effects in prose layout and triggered systematic re-reading of pre-rhymes. Moreover, we found a clear effect of number of syllables, further indicating subvocalized reading and strongly suggesting a close eye-to-(inner)-voice span. For presentation mode, the presence of anomalies had differential effects: participants initially read slower in poem layout when anomalies were present, but adapted to them in later trials, which they did not in prose layout. In general, the overall pattern of results suggests that eye-movements reflect, and are closely aligned with, the rhythmic subvocalization of MRRL.

Role of modality in human multitasking

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Multitasking refers to the requirement to coordinate the processing of two tasks that are performed either sequentially (task switching) or simultaneously (dual tasks). Relative to performing a single task, multitasking usually incurs performance costs. Standard theoretical approaches assume that these are due to amodal "central" structural limitations, such as a time-consuming "task-set reconfiguration" process (in task switching) or a structural, serial all-or-none decision and response-selection "bottleneck" (in dual tasks). The notion of a "central" process thus implies independency of sensory or motor processes, thus implying amodality. However, while the notion of modality-specific processing resources has some tradition in dual-task research (e.g., suggested by Wickens, 1984), there is little theorizing about the role of modality in work on sequential task switching, presumably because this experimental paradigm has been used to examine cognitive control, which is defined in rather abstract terms. In the presentation, we describe empirical effects showing modality-specific influence on the task mappings (e.g., auditory-vocal tasks, visual-manual tasks) in task switching, and we propose a theoretical account in terms of action control mechanisms based on online prediction of intended action effects ("ideomotor" account). Specifically, we propose that modality-specific confusion of separable task mappings is a major mechanism underlying multitasking "crosstalk" in action selection.

Same same, but different: Lack of transfer between task switching and dual tasking

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In everyday life, multi-tasking describes the challenge to rapidly switch between different tasks. Such switching can occur in sequential order (writing an email – making a phone call) or simultaneously (reading an email while on the phone). In the lab these challenges are investigated in two different paradigms, the task switching (TS) and the dual task (DT) paradigm. So far, however, it is unclear whether both, TS and DT, rely on the same/shared mechanisms or are distinct in nature. Therefore, we investigated whether the switch frequency effect found in TS would generalize to DT. Frequent (as compared to rare) task switching reduces switch costs and increases the voluntary switch rate, presumably because both tasks are held active in working memory. In three experiments, we investigated whether this switch frequency effect would generalize to DT: Participants were either forced to switch seldom (stability) or often (flexibility). We consistently found a switch frequency effect in terms of reduced switch costs in the high switch condition but no evidence of transfer in DT parameters. There was neither an effect on backward crosstalk nor on the PRP effect. This held true for a block-wise design (first TS block, then short DT block) as well as single DT trials interspersed within the TS trials. The results thus point to the importance of addressing the distinct mechanisms underlying TS and DT processing.

Same same but different? Readers differentiation between human and AI poetry

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The present study investigates narrative texts generated by an AI-tool (the Generative Pretrained Transformer 2 Model, GPT-2). In a creative writing scenario, the first few lines of unfamiliar poems and short stories were continued with a GPT-2-based interactive interface (only minor human edits allowed) or by humans with a literature background without this tool (purely human continuations). In the next step, 120 participants were provided with 18 original beginnings plus one of the two continuations (9 written with the help of the AI-tool, 9 purely human-written). Participants had to decide if a continuation was written with the help of the AI-tool or not (task sensitivity) and indicate the confidence in their decisions. Based on previous findings, we expected lower task sensitivity for AI-texts than for human-written texts. Nonetheless, we also expected human-written texts to be more convincing than texts written by the AI-tool in terms of stylistic quality (e.g., inspiring, aesthetic, fascinating, interesting, and well written). Results showed that participants misclassified 42% of AI- and 40% of human-written texts, with no significant difference between participants' sensitivity and specificity in identifying AI-written texts. In line with this, participants showed no difference in their decision confidence when presented with AI compared to human written texts. At the same time, these results

indicate that readers could not reliably distinguish between the two text categories. However, regarding criteria for perceived stylistic quality, the participants' evaluation shows that AI texts are perceived as less inspiring, aesthetic, fascinating, interesting, and well written than human-written texts ($p < .001$ for all criteria).

Self-focused attention in social anxiety: A naturalistic eye-tracking investigation

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Social anxiety (SA) is characterized by excessive self-focused attention (SFA) which inhibits attention to positive external cues, thus maintaining the condition. Hence, attentional training techniques emerged as a tool to reduce anxiety by helping shift attention externally. However, such task relied on verbal instructions to shift attention externally with unknown efficacy. Therefore, we used eye-tracking to manipulate SFA and examine its relationship to SA objectively. Participants ($N = 80$) engaged in two Skype conversations. In one, their own image was visible (self-focused attention) whilst in the other it was not (external-focused condition). Participants' eye-movements were recorded whilst they talked to the confederate whose emotional expressions changed throughout. A Self-report measure of trait social anxiety was administered to create high (HSA) and low social anxiety (LSA) groups, along with a measure of state anxiety taken at three time points. Preliminary results show that, as predicted, increased dwell time to the self-image occurs in both groups when it is visible, indicative of increased self-focus. Although there were no differences in groups on gaze to the experimenter in both conditions, HSA group showed increased dwell-time to background suggesting a degree of avoidance. HSA group also reported increased state anxiety regardless of whether the self-camera was on or off. Further eye-movement analyses as a function of emotional expression will be presented and results discussed with reference to the efficacy of attentional training interventions for SA.

Self-relevance, but not goal-relevance, increases aesthetic appeal of synthetic artworks

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Aesthetic experiences with artwork can be highly impactful, yet it is not well understood why some artworks touch us more than others. In previous work, we found that self-relevance, defined as whether an artwork relates to one's self-identity, interests and past experiences, was a strong predictor of aesthetic appeal. We hypothesized that the presence of personally relevant information in artworks allowed for deeper processing and hence greater aesthetic appeal. In this experiment, we sought to test whether a different type of relevance, goal-relevance (does the content of the artwork relate to current goals or tasks), would have a similar effect. We manipulated goal-relevance using an ownership task. During the training phase, participants learned the assignment of 20 different ob-

jects as either self-assigned ("Mine") or as other-assigned with a gender neutral equivalent ("Pat's"). Better performance and faster reaction times for identification of self-assigned items suggested that, on average, the task was successful at creating a tighter link to the self-assigned items. In a second phase, observers viewed a set of synthetic artworks that depicted the objects from the ownership task, intermixed with a set of real artworks. In a first block, the participants rated how aesthetically moving they found each artwork. In a second block, they rated the same set of artworks for self-relevance. Synthetic artworks containing objects from the self-assigned versus other-assigned conditions did not differ on either aesthetic ratings nor judgments of self-relevance. This suggests that unlike links to autobiographical memory, identity and interests, manipulation of goal-relevance via the ownership task was not sufficient to engage deeper processing and affect aesthetic appeal.

Semantic accounts of risk perception

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Computational techniques that extract semantic representations of words from text corpora have shown promise in predicting risk perception. We investigate how an alternative route to semantic representations based on free associations compares to the text-based and the traditional psychometric approaches to risk perception. To this end, we recruited published data encompassing 307 risk sources and compared the out-of-sample predictive accuracy using a machine learning approach. The text-based approach employs fastText: a pre-trained model composed of 2M word vectors. The psychometric approach takes human judgements on nine dimensions of risk as input. Finally, the association-based representation was derived from over 3.6M free associations from the Small World of Words study. Firstly, we determined the pointwise mutual information between cues and responses. We then employed singular value decomposition to extract 300 dimensions that were comparable to those in fastText. We find that despite the association-based approach being trained on a dataset that is orders of magnitude smaller than fastText, out-of-sample accuracy for both models is equivalent, and comparable to traditional psychometric approaches. Furthermore, whilst dimensionality-reduced versions of the text-based approach see considerable decreases in out-of-sample performance, equivalent reductions of the association-based approach see no such decrease. Finally, notable gains in accuracy were achieved by combining the psychometric model with each semantic model, and these gains were greater when combining with the association-based representations than with the text-based. This suggests the risk-relevant information in free associations provides greater purchase on the psychometric approach than does text.

Semantic associative effects in directed forgetting: Evidence from ERPs

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Can humans intentionally "forget" implicitly conditioned associations between words that have been shaped due to a long common learning history? In the present study, we use co-occurrence statistics to define associations, and examine target words with many vs. few associated words in a directed forgetting task. 28 participants learned a series of Chinese words with many or few associated words in the study phase. Each target word was followed either by cue R prompting the subjects to remember the word, or cue F prompting the participants to forget the word. In the test phase, participants made an old/new word decision on presented words. The behavioral results showed that the accuracy of target words with many associates was higher, which suggests that these implicitly conditioned long-term associates can help to follow the R/F instruction. Words with only a few associates evoked a larger P2 and LPC amplitude in the study phase, potentially indicating a deeper processing of associatively isolated words. In an N2 time window, F cues evoked a larger amplitude than R cues, reflecting the recruitment of cognitive (memory) control. As opposed to the study phase, many associates elicited a larger P200 amplitude, probably because of their shallower encoding. In the frontal region, in contrast, words with only a few associates elicited a larger FN400 amplitude only for erroneously remembered items, suggesting a familiarity-based false memory decision. In sum, our results suggest that intentional forgetting and remembering is affected by a common learning history of the study items, highlighting the importance of long-term associations for the cognitive control of episodic memory processes.

Semantic or affective primacy? Latencies of object recognition and affect: A comparison of rotating spot and speeded reaction time measures

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According to the semantic primacy hypothesis of emotion generation, stimuli must be recognized (semantically categorized) to evoke emotions. Chronometric evidence for this hypothesis has been obtained in previous studies by the authors with several different latency measurement methods: temporal order judgments, simultaneity judgments, the rotating clock hand (RH) method, and speeded reaction time (sRT) measurements. To consolidate, generalize and extend these findings, we conducted a new study in which RH latency measurements were directly compared to sRT measurements obtained from the same participants. An improved RH method was used and two clock hand speeds were compared. In sessions one and two, the participants viewed 40 pleasant and 40 unpleasant pictures while a clock hand, symbolized by a colored line, revolved quickly around the center of the picture. In different blocks of trials, the participants indicated when they experienced the pleasant or unpleasant feeling evoked by the picture, and recognized

the depicted objects or scene, by reporting the position of the clock hand at the time when these mental events occurred. In a third session, the same latency measurements were obtained using sRT. In addition, we timed the recognition of color and the speed of valence judgments using the two latency measurement methods. Currently we are still in the process of data collection.

Semantic or affective primacy? Perceptual latencies of stimulus recognition and affect for sounds, measured with the rotating spot method

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According to the semantic primacy hypothesis of emotion generation, stimuli must be recognized (semantically categorized) to evoke emotions. Chronometric evidence for this hypothesis has been obtained in previous studies for pictures as affect-evoking stimuli. Here, we tested whether these findings generalize to affect-evoking sounds. To measure the perceptual latencies of sound recognition and sound-evoked affect, we used the rotating spot method of timing subjective events. Participants listened to 12 pleasant and 12 unpleasant sounds familiar from everyday life while watching a spot that revolved quickly around the perimeter of a simulated clock face. In different blocks of trials, they indicated when they experienced the pleasant or unpleasant feeling evoked by a sound, and recognized the sound, by reporting the position of the spot at the time when these mental events occurred. Replicating previous findings obtained for affective pictures, the latency of object recognition was shorter than the latency of affect, and the two latencies were positively correlated. The findings extend chronometric support for the semantic primacy hypothesis to affective sounds.

Semantic ssociations increase memory for items, not binding

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Verbal working memory (WM) is strongly influenced by semantic similarity and association between items. Serial recall of lists of semantically related words is better than of unrelated words. In this study, we assessed the possibility that semantic associations support WM maintenance via increased item-context binding strength. We manipulated semantic relatedness in a serial order reconstruction task (Exp. 1), a mixed immediate serial recall and serial order reconstruction task (Exp. 2) and an item-spatial association task (Exp. 3). These three experiments led to a clear convergent pattern of results: semantic relatedness did not affect performance in any condition that required only memory for word-context bindings. Therefore, it did not increase item-context binding. Using a computational modeling approach, we restrict the plausible range of mechanisms underlying semantic associative effects. Specifically, we show that semantic associations could benefit WM via stronger availability in activated long-term memory, or by efficiently using semantic information to restrict the set of candidates at a redintegration stage.

Short-term pre-exposure to modality mappings: Modality incompatible single-task exposure reduces modality-specific between-task crosstalk in task-switching

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Modality compatibility refers to the similarity of the stimulus modality and the modality of the sensory-response effect that the response produces (i.e., vocal responses produce auditory effects). In this study, we investigated the effect of short-term pre-exposure of modality-compatibility in task-switching. To this end, participants were exposed to either modality compatible (visual-manual and auditory-vocal) or modality incompatible (visual-vocal and auditory-manual) single-tasks. After a short-term single-task pre-exposure (with either both modality compatible tasks, 2×80 trials each, or both modality incompatible tasks, 2×80 trials each), participants were transferred to a task-switching situation, where they switched between tasks in both a modality compatible and an incompatible condition. We found that after pre-exposure to modality compatible single-tasks the effect of modality compatibility persisted (i.e., larger switch costs with modality-incompatible tasks compared to modality-compatible tasks). In contrast, after pre-exposed to modality incompatible single-tasks, modality compatibility no longer influenced switch costs. We assume that long-term modality-compatible associations could be overridden by short-term, task-specific associations to reduce between-task crosstalk.

Signal integration and memory in the sensitive plant *Mimosa pudica*

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In recent years, researching the cognition of organisms without a nervous system has unearthed memory and learning in various instances. This allows for comparative studies to find universal traits of cognition and differentiate them from those that originate from the nervous system. In this regard, plants are an interesting model as multicellular organisms with a very different evolutionary history from animals. While not without controversy, behavioral research in plants suggests much more complex environment-interactions and decision-making than previously thought. Here, we investigate memory and signal integration in Mimosa pudica, a common model for plant-behavior, as its unique leaf-folding behavior is fast enough to be immediately observed. Mostly known for its innate circadian rhythm and signal transduction, the plant is also able to differentiate between different types of aversive stimuli and habituate to some of them, as shown by Gagliano et al. (2014). To test the plant memory, young plants were kept in a greenhouse with a multitude of natural stimulation from wind, water and insects. Over the course of two days, the plants in the experimental group were multiple times subjected to a flash of light followed by standardized mechanical stimulation, while plants in the control-group were subjected to the mechanical stimulation without the flash of light. During the learning process, and also on the third, seventh and fourteenth day, duration of leaf-folding

was recorded and compared between groups. Plants in the experimental group showed gradually faster leaf-opening than the control group during training and on the third day, while the effect slowly fades between subsequent testing. This implies signal integration and memory mediating the plant behavior.

Simultaneity perception: Effects of spatial attention and stimulus eccentricity

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Previous studies have shown that exogenous spatial attention not only improves the spatial resolution in visual perception tasks, but also affects the performance in high temporal resolution tasks such as simultaneity judgement task. However, these studies only examined limited spatial locations of the stimuli and led to inconsistent results. The present study aims to further explore whether simultaneity perception and its attentional modulation are eccentricity dependent, i.e., the perifoveal and peripheral visual fields show some differences. Using a spatial cueing paradigm, simultaneity judgement task was performed in a group of university students at both the spatially cued and uncued locations of different eccentricities. The results showed that the point of subjective equality (PSE) was significantly lower for the cued location relative to the uncued location, indicating a facilitation effect of spatial attention on simultaneity perception. Besides, the PSE was also lower for the perifoveal region compared to the more peripheral region. Further analyses using signal detection theory revealed that the sensitivity of simultaneity judgement was significantly higher in the perifoveal region relative to the more peripheral visual field. Our findings indicate on the one hand a facilitation effect of spatial attention on simultaneity perception, and on the other hand an eccentricity effect of simultaneity perception. Presumably, our simultaneity perception has different sensitivity in the perifoveal and peripheral visual fields, but they both subject to the modulation of exogenous spatial attention.

Simultaneous detection and identification – what an eyewitness task can teach us about models of recognition memory

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Research regarding eyewitness identification is just beginning to explore the potential of mathematical modeling. However, an eyewitness lineup task – also known as simultaneous detection and identification – can in turn also provide a potent and unfortunately underused empirical paradigm that enables us to validate central assumptions of formal recognition memory models. We present a simultaneous detection and identification paradigm with similar lures (i.e., nonstudied faces, each of which resembles a studied face) to conduct a novel test of such models. Results showed that (1) people were more likely to think a target was present during a target trial when the target was accompanied by a similar lure than when the target was accompanied by a regular lure instead;

(2) people were more likely to correctly identify the target item when they were more confident that a target was present; and (3) people were more likely to falsely identify a similar lure over a regular lure when they were more confident that a target was present. Quantitative analyses show that many recognition memory models based on signal detection theory must predict these patterns under plausible distributional assumptions, but a two-high-threshold model cannot predict all three patterns simultaneously.

Slicing objects with a sword: Tactile suppression during a dynamic task in virtual reality

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When we move we generate predictions about the sensory states of our movement. When the actual experience matches our predictions, sensory feedback from the moving limb is typically suppressed as it is perceived as less reliable than the predicted sensory state. One example of this is tactile suppression where tactile sensations are reduced in a moving limb compared to a static limb. Previous research mainly relied on small-scale movements performed in highly controlled tasks. Virtual Reality (VR) allows for more dynamic, large-scale movements while the VR controllers provide a simplified way to track hand position and deliver vibrations. Here we investigated if tactile suppression could be found during a dynamic task in VR. Participants were placed in a virtual cabin and asked to cut an approaching rectangular object in half using a virtual sword projected over a VR controller. In three separate conditions we manipulated the prediction about the object's dynamics: as the participant moved to cut the object it (1) always maintained its current (0° or 90°) orientation, (2) always rotated by 90°, or (3) had a 50% chance of rotating. After cutting the object, participants were asked if they felt a vibration which was delivered via the VR controller during their movement. We hypothesized that unpredictable changes in the object's dynamics would lead to a decrease in suppression compared to predictable changes. In the predictable condition, our results show an effect of tactile suppression. When moving, there was a higher threshold for detecting a vibration compared to when static. This demonstrates that VR controllers can be used for performing psychophysical tasks. This effect is currently being replicated and expanded to include the unpredictable changes.

Social effort calibration. Why, when and how do we match joint action partners' effort investments?

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As humans, we have unique skills and motivations for cooperation not possessed by other species (Tomasello et al., 2012). One may speculate that comparing effort levels in joint action is crucial for evaluating the feasibility of interaction, for calibrating our own energy expenditure and for making decisions about partner selection. Indeed, there is some initial evidence that the perception of a partner's effort may under some circumstances lead us

to increase our own effort level in a joint task (Székely & Michael, 2018; Chennells & Michael, 2018). This raises the possibility that people may have a tendency to calibrate their effort level in joint actions by matching their partner's effort level. If so, it may help to stabilize people's motivation to contribute to mutually beneficial joint actions. First, I will provide an analysis of the functions potentially subserved by effort matching. Building upon this, I will spell out distinct hypotheses about why and when agents may calibrate their effort level to match that of a partner, and formulate testable predictions to differentiate among these hypotheses. Finally, I will present a series of experiments designed to test these predictions.

Social mindfulness and prosociality vary across the globe

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Humans are social animals, but not everyone will be mindful of others to the same extent. Individual differences have been found, but would social mindfulness also be shaped by one's location in the world? Expecting cross-national differences to exist, we examined if and how social mindfulness differs across countries. At little to no material cost, social mindfulness typically entails small acts of attention or kindness. Even though fairly common, such low-cost cooperation has received little empirical attention. Measuring social mindfulness across 31 samples from industrialized countries and regions ($n = 8,354$), we found considerable variation. Among selected country-level variables, greater social mindfulness was most strongly associated with countries' better general performance on environmental protection. Together, our findings contribute to the literature on prosociality by targeting the kind of everyday cooperation that is more focused on communicating benevolence than on providing material benefits.

Social preferences and envy: Linking benign and malicious envy with social value orientation

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Situations of disadvantageous inequality often elicit envy as a negative emotional response. To resolve it, an envious person can either strive to reach the superior status quo (benign envy) or can maliciously seek to restore equality so that the envied person loses her superiority (malicious envy). This project elaborates on the conceptual distinction between benign and malicious envy. Specifically, we investigate how benign and malicious envy relate to social preferences and develop an economic game to test whether dispositional benign and malicious envy predict envy-driven behavior. In two preregistered, incentivized online studies ($N = 609$), we (1) investigate the relation between Social Value Orientation (SVO) as a measure of social preferences and benign and malicious envy as individual difference measures and (2) validate the results in a newly developed economic game, mirroring benign and malicious envy as behavioral choice options. In both studies,

we find a negative relation between SVO and malicious envy in that increased malicious envy goes in line with an individualistic preference. Unlike previous results, we find a similar relation between SVO and benign envy. When forcing individuals to decide either in favor of the benign or malicious choice option in the envy game, prosocials are more likely to choose the benign (vs. malicious) behavioral option. However, dispositional benign and malicious envy are not predictive of behavioral choice in the envy game. Our findings contribute to the recent debate on the nature of envy. In particular, the finding that benign (as well as malicious) envy negatively relate to SVO contradicts the concern that measures of benign envy might merely reflect "constructive" or socially desirable responses to inequality.

Social sampling in the web 2.0 – how do online vs. offline networks influence our inferences about the world?

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Personal social networks can serve as an informative sampling space for decisions under uncertainty. Specifically, decision makers can infer unavailable social statistics (e.g., the relative frequency of health risks or consumer preferences in the population) by drawing samples from among the people they personally know. In light of the growing use of the Internet, much of our social interaction occurs online (e.g., on social media) rather than offline (e.g., personal contact). Here, we examine to what extent the usual mode of interaction (offline vs. online) with a network member affects people's social sampling. In an online study ($N = 138$), participants judged the popularity of holiday destinations, and recalled people in their personal (online and offline) social networks who had visited each destination. Additionally, participants indicated the respective interaction mode (offline, mixed, or online) and social category (self, friend, family member, or acquaintance) of each contact. We used a Bayesian hierarchical modeling approach to compare a limited search strategy based on interaction mode (online vs. offline) to a limited search strategy based on social category, an exhaustive sampling strategy, and random guessing. More than a third of participants (36.23%) were best described by an inference strategy that conducts a sequential and limited search based on interaction mode. Interestingly, those who followed such a search strategy also showed more egocentric search (i.e., they relied more strongly on their own experiences) than participants following a limited search strategy based on social category. Overall, these results provide the first evidence that interaction mode affects social sampling.

Sollen automatisierte Fahrzeuge bei Dämmerung Manöverentscheidungen anpassen, um sich erwartungskonform zu verhalten?

Matthias Beggiato, Ann-Christin Hensch, & Josef Krems
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Implizite Kommunikation in Form von Fahrzeugbewegungen (wie Geschwindigkeit,

Abstand, Verhaltensänderungen, Weglücken) spielt eine wichtige Rolle für ein sicheres und komfortables Miteinander von automatisierten und manuell gefahrenen Fahrzeugen. Entscheidungen für Abbiegemanöver vor Gegenverkehr sollen auch von automatisierten Fahrzeugen erwartungskonform getroffen werden unter Berücksichtigung relevanter Einflussgrößen. Im Rahmen des Projekts @CITY-AF (gefördert vom BMWi) wurden an der TU Chemnitz der Einfluss der Umgebungshelligkeit (Tag/Dämmerung) und Fahrzeuggeschwindigkeit auf Weglückenentscheidungen in einer videobasierten Onlinestudie experimentell untersucht. Einer Stichprobe von 50 Personen (Alter 18-80 Jahre, 37 weiblich) wurden vorab aufgezeichnete Interaktionsszenarien im realen Straßenumfeld randomisiert dargeboten. Die Videos zeigten ein Links-Abbiegemanöver aus Fahrerperspektive bei Tageslicht und mittels künstlicher Abdunkelung erzeugter Dämmerung. Die Geschwindigkeit des Fahrzeugs im Gegenverkehr wurde von 10-40 km/h in 5 km/h-Schritten manipuliert. Per Tastendruck musste die späteste noch akzeptierte Weglücke zum Start des Abbiegemanövers angegeben werden. Die so ermittelten Weglücken sanken nichtlinear bei steigender Geschwindigkeit (riskanter) und bei Dämmerung wurden in allen Geschwindigkeitsstufen statistisch signifikant höhere (konservativere) Weglücken gewählt. Allerdings beträgt der mittlere Unterschied der Weglücken zwischen Tag und Dämmerung nur 0.24s, was für die praktische Anwendung in automatisierten Fahrzeugen als vernachlässigbar angesehen werden kann. Um menschlichen Erwartungen zu entsprechen, sollen automatisierte Fahrzeuge daher vor allem die ermittelten Weglücken in Abhängigkeit der Fahrzeuggeschwindigkeit berücksichtigen.

SpAM^3-VR: A tool to measure conceptual space in virtual space

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The similarity of stimuli is important for many social scientists. For example, stimulus similarity is a crucial determinant of processes in memory retrieval, attention, stereotyping, or consumer choice. Yet, measuring similarity is often hard. One method are pairwise comparisons: Participants simply rate the degree of similarity for pairs of the stimuli. This method has many advantages but is cumbersome for large stimulus sets—the number of required pairwise comparisons increases exponentially (e.g. 24 stimuli = 276 ratings). An alternative is the Spatial Arrangement Method (SpAM, Hout et al. 2013, JEPGen) in which participants simultaneously arrange stimuli on a computer screen, placing similar stimuli closer together and dissimilar stimuli further apart. This method is highly efficient but can underestimate the complexity of conceptual space because of the limitations imposed by the 2D-plane of the screen. We present SpAM^3-VR as an alternative tool breaking these boundaries: We measure similarity by letting participants arrange stimuli in 3D virtual space. We conducted two studies (total $N = 297$) comparing these methods with face stimuli. The data support that SpAM^3-VR is not only intuitive and fun to use, but also efficient and reliable. We highlight when and when not SpAM^3-VR proved to be superior to its alternatives. Furthermore, we hope that the tool is a showcase of how the flexibility of VR can be harnessed for measurement in psychology.

Speeded inference game: Opening a new chapter in the assessment of error awareness

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Influential theories on error processing assume that when we conduct errors, adaptive processes are triggered to improve our behaviour and prevent errors in the future. These processes appear to be more effective after participants detect errors. Therefore, the assessment of error awareness allowing a differential analysis of detected and undetected errors in the context of cognitive control and behavioural adjustments has gained more and more attention in the past decades. A common methodological challenge posed on all studies investigating error detection is that the number of undetected errors is usually relatively low. In this talk, we introduce a gamified experimental task that aims to overcome the described methodological limitations. By using an adaptive algorithm, the task generated a robust and stable amount of errors with a high rate of undetected errors. Further, we were able to identify error types, which interestingly differed in terms of their detection rate. Moreover, the game-like appearance of the novel experimental task led to highly motivated participants. The results of the first study were replicated and extended by a second behavioural study. Notably, in study 2, a change in task design specifically modulated error detection, while these changes did not affect the total error rate. The talk will highlight potential applications of the open-source code.

Splash – eye movements during unexpected material behaviors

Alexander Goettker, Doris I. Braun, Karl R. Gegenfurtner, & Katja Doerschner
Giessen University

Anticipating changes in the environment is a critical ability that allows the visual system to compensate for its inherent sensory processing delays. To achieve this we can draw on prior knowledge and experience about events in the world to plan our eye movements for optimal sampling of visual information. While many dynamic events in our environment follow predictable patterns in space and time, not all are predictable. How visual sampling changes for such surprising events is not well known. Here we compare eye movements of 14 observers watching movies showing expected and surprising material deformations. Stimuli were videos that showed different familiar everyday objects (e.g., chair or teacup) falling from a fixed distance to the ground floor in a virtual room. Upon impact, the objects could either behave in a predictable or unpredictable way: For example, a falling chair could tip over but stayed solid (expected) or it could splash like milk into little droplets and splatter on the ground (surprising). To reduce the availability of context cues, and therefore the strength of the expectation about an object's material properties, objects were also presented as white masks in front of a black background. We observed that for the surprising videos eye movement patterns deviated systematically: the initial fixation after impact was shortened and the following fixation was prolonged and located closer to the center of the object in comparison to fixation patterns for expected stimuli.

This effect on fixation behavior was stronger for the videos with full context cues available. Our results indicate that, when confronted with unexpected material behavior eye movement strategies are adapted to maximize the informational value about the material behavior of the object.

Stand up for your brain: The effect of body posture on arousal, effort, and executive functions

Henk van Steenbergen
Leiden University

Humans are not evolved to spend most of their time sitting, thinking, and typing. Nevertheless, in most modern jobs, office employees typically perform intense mental work in an environment encouraging little physical activity. Prolonged seated work induces mental fatigue and can impair cognitive performance. In this talk, I present a study in which we tested whether alternation in body posture (in comparison to prolonged sitting) counteracts declines in arousal and performance. Participants worked on a battery of three executive functions tasks over two hours. This resulted in a global increase of self-reported fatigue and a global reduction of arousal over time, accompanied by impairments in working memory and overall performance in the flanker task and switch task. The effects of standing versus sitting were mainly observed locally, showing acute increases of arousal, EEG alpha desynchronization, a shift in sympathovagal balance in heart rate variability, and reduced self-reported effort costs. Standing also improved overall performance in the flanker task and drift-diffusion analyses show that this effect reflected an improved drift rate accompanied by a reduced non-decision time. Over time, HRV increased more rapidly in the alternating posture condition, suggesting it had a positive effect on vagal tone. These findings extend the growing literature on the positive effects of the use of sit-stand tables on physical health and reveal how and when an active body posture has beneficial effects on the body, brain, and body.

Step by step – prediction errors from walking shape visual far space

Michael Wiesing & Eckart Zimmermann
Heinrich Heine University Düsseldorf

How can our visual system provide an estimate where objects are located in far space? Any neural spatial map must be provided with information about how the internal space scales with actual, external distances. Like the scale of a pictorial representation can never be determined by another picture but only by a comparison with reality, this information cannot be conveyed by purely visual or oculomotor cues (e.g., vergence). Yet, visual depth perception is mostly understood as a purely visual problem. Here, we show that action and perception are tightly coupled: Prediction errors resulting from goal-directed walking immediately changes the perception of egocentric distances. State-of-the-art virtual reality technology used to measure walking distances, while simultaneously manipulating optic flow in a realistic, ecologically valid manner. We asked participants to

walk toward an object located 2.50m in front of them. Unbeknownst to the participant, we manipulated the optic flow during walking. Under this manipulation, participants partly adjusted their walking speed to experience optic flow at the expected velocity. After each walking trial, participants had to visually localize an object presented between 0.80m and 1.80m in front of them. We found a serial dependence between optic-flow speed during walking and subsequent verbal distance estimates. Our results demonstrate that walking through an environment biases visually perceived egocentric distances to account for the mismatch between predicted and actual distances. Closing the action-perception loop via negative feedback from the external world, keeps perception veridical and resolves the ambiguities inherent in the perception of far space.

Stimulus complexity affects item retrieval mechanisms during recognition and inter-item associative memory

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The characteristics of items that are encoded as part of a pair may affect inter-item associative memory, but the circumstances in, and the mechanisms by which, this relationship holds are to date unclear. In the present study, participants studied pairs of objects via interactive imagery, which were presented either as simple, black line drawings (low visual complexity condition) or as color photographs (high visual complexity condition). Subsequently, item and associative recognition tests were completed. We thus examined the effects of visual complexity on item retrieval mechanisms, indexed by event-related potentials (ERPs) during the recognition test, and on associative memory performance. Memory for the objects was improved, but associative memory for the pairings was reduced, in the high visual complexity condition, supporting the view that item characteristics affect inter-item associative memory. ERPs recorded during the recognition test revealed a more pronounced late posterior negativity (LPN) in the high visual complexity condition, which masked the late parietal old/new effect indicative of recollection, presumably reflecting the enhanced effort of reconstructing multi-featured memory representations of visually complex items during retrieval. Stimulus complexity can thus improve item memory, presumably by providing more diagnostic features to distinguish studied from new items during recognition. At the same time, stimulus complexity may impair associative memory because a heightened requirement to reconstruct the item-specific memory trace may leave fewer resources to retrieve inter-item associative information.

Stimulus-response binding and retrieval is independent of affective consequences: Implications for theories of learning and behaviour automatization

Juhi Parmar & Klaus Rothermund
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Stimulus-response binding and retrieval (SRBR) is a fundamental mechanism driving

behaviour automatization. In 4 experiments, we investigated the modulatory role of performance-dependent and performance-independent affective consequences on stimulus-response binding and retrieval (SRBR) in order to test whether binding/retrieval can explain instrumental learning. SRBR effects were assessed with a colour categorisation task in a sequential prime-probe design, with an orthogonal variation of Response relation (colour repetition vs. change) by Distractor relation (word repetition vs. change). Binding/retrieval effects are measured by an interaction of the two factors, with distractor repetition leading to facilitation in conditions where the response must be repeated, but leading to interference when the response changes from prime to probe. Positive, neutral, or negative events signaling changes in points were delivered after every trial, which were linked to monetary gains or losses on a block level, to investigate whether affective consequences modulate the binding/retrieval effect. Consistently across all 4 experiments (total $n = 338$), we did not find any evidence for an affective modulation of RT-based binding/retrieval effects, indicating that these effects are fully automatic and independent of (performance dependent and independent) feedback. Results are discussed with regard to their implications for theories of learning and habit formation.

Studying technology interactions in dynamic social contexts: Methodological limitations and perspectives

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The way we interact with technology both shapes and is shaped by the social setting. For example, a phone call on a train may disturb other passengers. But if one of them seems unusually interested in the phone conversation, the caller may also feel disturbed and become more conscious about which private details to reveal. Such everyday social experiences turn out to be surprisingly difficult to study experimentally. Reciprocal relationships between potentially large numbers of activities do not fit in traditional, unidirectional experimental designs in which a controlled, independent factor influences the "only dependent" measure (e.g., van Berkel, Dennis, Zyphur, Heathcote, & Kostakos, 2020). As a result, relying on rigid experimental approaches alone may result in lower ecological validity. In two studies on the above scenario of passengers using mobile phones on trains, we combined a traditional experimental vignette paradigm with a complementary agent-based model. In the 2×2 vignette study, we varied two different types of phone calls (loud vs. silent) and two different observer activities (reading vs. trying to listen in). Our participants were asked to take the observer's perspective. This vignette approach provides (static) insights into realistic, technology-mediated experiences, but depends on the specific set of activities in the scenario. The complementary agent-based model allows to extend these insights by highlighting dynamic interactions between arbitrary numbers of actors in massive "experimental designs" (e.g., over 100 different factor combinations). However, it relies on simulated data. We discuss the potential and limitations of such methodological combinations for studying technology-mediated experiences in social contexts of different scales.

Subjective information processing awareness in hybrid closed loop systems – human-AI interaction in personalized medicine

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While interacting with artificial intelligence (AI) in systems, users experience automated information processing, which can remain hidden to them. Grounded in research on human-automation interaction, we propose Subjective Information Processing Awareness (SIPA) as a metric of user experience in Human-AI interaction contexts. SIPA can be defined as the experience of being enabled by a system to 1) perceive, 2) understand and 3) predict its information processing. For example, in hybrid closed loop systems in the medical domain as for example in diabetes therapy users interact with AI systems on a daily basis already today. Recently, automated insulin-delivery (AID) systems calculate the insulin need based on physiological measures. However, they still need information provided by the user e.g., on physical activity. For a successful implementation of AID systems, it is crucial that users trust and understand the performed insulin need calculation. The objective of the present research was to advance understanding about the experience of people interacting with AI in the context of personalized medicine. In an experiment with diabetic patients, we modified the amount of information an AID system presents to the user as a between-groups variable. To this end, participants were repeatedly shown the system's calculated insulin need as well as the input information it processed. We also examined, to what extent participants were able to predict the calculated insulin need. The analyses will focus on 1) the development of the dependent variables after repeated interactions, 2) the relationship between SIPA performance and 3) the correlation between trust and SIPA. We expect implications regarding the effects of explanations on subjective experience in Human-AI interaction.

Subsequent memory effects in fear learning and how they could be modulated

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It is important for our mental health to reliably discriminate between threat and safety. Particularly, deficient safety learning seems to be related to anxiety. In a series of three experiments, we aimed for identifying event-related potentials (ERPs) that predict successful threat and safety learning and tested the impact of attention on them. In the first experiment, participants incidentally learned that some neutral faces (CS+) were associated with an aversive outcome (US), while others (CS−) were safe. We found that an enhanced late positive potential (LPP) to both CS+ and CS− during learning predicted subsequent memory, while a quadratic relationship with confidence in memory indicated a possible role in both correct and false fear memory. Moreover, the P300 to the US and to the omission of the US (following CS−) was enhanced for remembered associations. In a second experiment, we examined if these results would replicate in an intentional learning task, which more adequately mimics exposure therapy. Again, the LPP to CS+ and

CS−, as well as the P300 to the outcomes of stimuli displayed subsequent memory effects. Importantly, in both experiments, remembered associations were also related to feelings of fear at a later point in time. Finally, in a third experiment in which associations were much easier to learn, one group of participants was specifically asked to pay attention to the US, the other group to the omission of the US. This attentional allocation modified the amplitude of earlier identified ERPs, particularly the P300 to the omission of the US. In conclusion, our findings highlight the importance of attention to the omission of threat for successful safety learning and ERPs might be used to track this process in order to improve the unlearning of fear.

Support for spatial rather than object-based saccadic selection in visual short-term memory

Laura Alexandra Wirth, Olga Shurygina, Martin Rolfs, & Sven Ohl
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Saccades, planned and executed after a transient presentation of visual information, guide selection of what information is retained in capacity-limited visual short-term memory (VSTM; Ohl & Rolfs, 2017). Here, we investigated whether saccadic selection in VSTM is space-based, that is, a benefit confined to the saccade target location, or object-based, providing a benefit across the extent of an object at the saccade target. We presented a memory array consisting of 3 oriented Gabors and 5 noise patches, forming an imaginary octagon, for 100ms. 400ms after the offset of the array, a movement cue appeared at fixation, instructing observers to move their eyes to the indicated location. Another 800ms later, a probe highlighted one of the locations that previously contained an oriented Gabor, and observers reported the orientation they remembered seeing there (clockwise or counterclockwise from vertical). In half of the trials, two black contours each surrounded four adjacent locations in the array, grouping them into separate objects (object trials). In these trials, the probed location could be part of the same object or a different object. We randomly interleaved these trials with trials in which we presented no grouping elements (no-object trials). We observed strong saccadic selection in VSTM—memory performance was best when memory was probed at the saccade target. Overall, the presence of objects reduced memory performance as compared to no-object trials. However, accounting for the spatial distance between the probe and the saccade target location, we did not observe a significant difference in performance for items presented in the same vs different object as the saccade target. Our results thus favor spatial, rather than object-based, saccadic selection in VSTM.

Sustaining global public goods through intergroup interactions

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Humans create and join groups in which they cooperate to tackle shared problems and increase joint welfare. Such group cooperation allows to establish club goods – goods that benefit group members, while members of other groups can be excluded from their

consumption and benefits. Many mechanisms, like peer punishment or reputation, have been shown to foster cooperation in small groups. However, being faced with global public goods problems, like climate change, the question arises how cooperation can emerge beyond confined groups, across group boundaries, and to the benefit of larger collectives. Using simulations, we show that frequent intergroup interactions play an important role in fostering global as opposed to group-based cooperation. We further show that decreased fragmentation of the population, i.e., a collective that is comprised of fewer sub-groups, increases the likelihood that true public goods rather than club goods are established. We further test core predictions of our model experimentally. Taken together, we identify why and when intergroup contact and reciprocal interactions across group boundaries are needed to establish cooperation that transcends group boundaries and allows to tackle global public goods problems.

Tactile perception during grasping

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Tactile perception is impaired on a limb that is moving compared to when it is static. This tactile suppression is possibly a result of an internal model that predicts future sensory states of the moving limb and suppresses associated feedback arising from that limb. Because such predictions are based on an interplay between efferent and afferent feedback signals, tactile suppression may also depend on the relative need to process sensory feedback from the moving limb. To test this, we asked participants to perform reach-to-grasp movements under different grasping demands: the target object had either a slippery or rough surface while grasping was performed both with and without vision. As expected, participants grasped more carefully when interacting with slippery than rough objects, and when performing the task without vision. This denotes a greater need for somatosensory guidance to appropriately bring the digits on the object. Accordingly, tactile suppression was weaker when grasping low than high friction objects, but only when grasping without vision. This suggests that tactile suppression is modulated by the prevailing grasping demands: It is downregulated with an increased need to process somatosensory feedback signals from that moving limb, for instance when somatosensory input about the digits' state is the sole sensory source and when this source is particularly important for the task at hand.

Taming dynamic environments: When do children learn to choose adaptively?

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Children face many challenges early in life that require them to learn from probabilistic outcomes, e.g., inferring the meaning of a new word. Likewise, probability learning remains an important ability in everyday adult life. What route to take to avoid traffic jams? In these examples, probabilities associated with different outcomes are dynamic

and may change over time. However, established developmental probability learning paradigms usually assume static probabilities throughout an experiment. How do children learn to make choices adapted to a more ecologically plausible environment? In this ongoing study, we compare how children between the age of 3 and 11 years as well as young adults learn to make adaptive choices in probability learning paradigms with different statistical environments: Probabilities associated with outcomes remained either static throughout the task ($N = 323$) or varied over time as a function of prior choices ($N = 116$). Across two paradigms with static probabilities, we found that $3-4$ year-olds were most persistent in their choices and tended to maximize probability while school-aged children rather probability matched. When outcome probabilities depended on prior choices, participants across all age groups engaged in choice diversification close to probability matching and improved performance over the course of the experiment. However, toddlers did so less effectively and did not reach the performance level of older children and adults. Our preliminary results indicate that the ability to use adaptive choice strategies in probability learning tasks is already present early in life and that only little life experience is needed to exploit ecologically plausible, dynamic environments.

Temporal and spatial reference frames in visual working memory

Anna Heuer & Martin Rolfs
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Time and space are ubiquitous dimensions that shape how we perceive and remember visual events. While the importance of space for visual working memory is widely accepted, we know much less about the role of time. Here, we show that both spatial and temporal properties are incidentally encoded along with to-be-remembered information, providing reference frames for storage and retrieval. Across series of experiments, participants performed a colour change-detection task, in which each item has unique but task-irrelevant spatial and temporal coordinates at encoding. Reducing the availability or integrity of spatial and temporal structures of item presentation at retrieval resulted in performance costs, indicating that spatial and temporal properties are encoded to support memory even when these are known to be irrelevant, unreliable and/or not available at retrieval. The weighting of spatial and temporal information depended on the distribution of items in space and time, demonstrating that temporal context can be more important than spatial context. Individuals substantially differed in their weightings, exhibiting clear preferences for coding spatially or temporally that remained stable across sessions separated by weeks or even months. Transforming spatial and/or temporal structures at retrieval revealed that both spatial and temporal reference frames are primarily defined by inter-item relations – including relative distances between items as well as their order – rather than by absolute positions in space or time. Overall, these findings showcase the functional equivalence of the spatial and temporal dimensions in visual working memory, indicating that they play similar roles as primary context dimensions that scaffold and support memory representations.

Temporal statistical learning in the arcade game Whac-A-Mole

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Statistical learning (SL) is the ability to automatically learn regularities of our world in order to predict future events. SL not only allows us to predict what will happen, but also when. Such temporal SL has received little attention thus far. We developed a paradigm inspired by the arcade game Whac-A-Mole (WAM) to study temporal SL. In WAM, participants score points by 'whacking' sudden-onset targets ('moles') arranged triangularly on a screen with the mouse cursor. Unbeknownst to participants, one target appears regularly (every 3 s) while the others appear at random. We found that although participants were unaware of the regularity, they unintentionally utilized this information and responded faster and more accurately to regular targets. As the regular location and action were directly coupled, participants could have learned to orient their attention to the regular location, prepare the regular action, or a combination of the two. In preregistered follow-up experiments (https://osf.io/sgcun/ and https://osf.io/3b78x) we assessed what exactly was learned to improve behavior. In one experiment we decoupled location and action by using a color response-mapping (pressing colored buttons associated to colored targets). We found no temporal SL of either dimension, suggesting that their coupling may have a superadditive effect. Indeed, when coupling action and location for the color response-mapping, temporal SL reoccurs. Additionally, when controlling for Simon interference by arranging targets vertically instead of triangularly, we find advantages of the regular target reflected in higher hit rates for regular action, but not for regular location. Taken together, these results indicate that timing is integrated in action; without it, temporal SL does not emerge.

Testing the stochastic independence of processes within the dual process signal detection model

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The Dual Process Signal Detection Model (DPSD) of recognition memory (Yonelinas, 1994) assumes that recognition decisions arise as a combination of two processes: a threshold process called recollection in which a mnemonic state of certainty can be reached with a certain probability and an equal variance signal detection process called familiarity that is based on a continuous memory signal of stochastic nature. The model assumes that the two processes are stochastically independent – that is, that the probability of successful recollection is the same regardless of how familiar a stimulus is. Relaxing this independence assumption by introducing a correlation between recollection and familiarity induces violations of distributional assumptions for the familiarity representations of targets. Using this phenomenon, we tested the stochastic independence assumption empirically through competing predictions of the DPSD, where the independence assumption holds, and a variant of the DPSD, where this assumption is relaxed and familiarity and recollection are correlated (i.e., a correlation model): While the DPSD predicts equal

variance of the familiarity representations regardless of recollection, the correlation model predicts a variance reduction of the target familiarity representations that increases with recollection. To test these predictions, we modified the remember-know paradigm by including an additional task where the participants were asked to rate the familiarity of the stimulus after giving their "remember"/"know"/"new" response. The results of one experiment ($N = 100$) using this procedure are presented and implications for the independence assumption in the DPSD are discussed.

Test-potentiated new learning in tertiary education: On the role of experimental design and episodic memory

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Testing (by means of retrieval practice) is regarded as an effective learning technique. For example, retrieval can enhance encoding and/or retrieval of new information relative to restudy. This phenomenon is known as the forward effect of testing (FET). One major goal of this study was to examine whether the FET generalizes to a real-world context in tertiary education and to individuals independent of their episodic memory. To this end, $N = 245$ students underwent a 3-block learning paradigm during two sessions as an element of a general psychology course at the distant university in Hagen, Germany. In each session, participants studied three separate, new texts with the expectation to take a final free recall test on them. In the initial study phase of Learning Blocks 1 to 3, a text was presented. Following the study phases of Learning Blocks 1 and 2, participants completed an interim free-recall test or a restudy phase. In Learning Block 3, all participants received the criterial free-recall test, followed by additional tests of the texts from Learning Blocks 1 and 2. The experimental procedure was identical between sessions, except that the opposite practice type (retrieval vs. restudy) was implemented. Participants concluded the experiment in Session 2 with a test on episodic memory. As indicated by an interaction effect with test session, the results revealed a significant FET in Session 1 but not in Session 2. Furthermore, the size of the FET was not moderated by participants' age or episodic memory. In sum, these findings highlight retrieval practice as a learning tool for many students of different age and memory ability in tertiary education, though highlights the importance of the experimental design.

Text-picture combinations are integrated and validated automatically

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We investigated whether text-picture combinations are validated automatically. Whereas the cognitive theory of multimedia learning (Mayer, 2021) assumes active cognitive processing when learning with text and pictures, studies from text comprehension research suggest that text information is integrated and validated automatically. To answer the

research question, we adapted the epistemic Stroop-paradigm (e.g., Piest et al., 2018): Participants saw either valid sentence-picture combinations (i.e., a picture accompanied by a sentence describing the scene correctly) or invalid sentence-picture combinations (i.e., a picture accompanied by a sentence describing the scene incorrectly). Importantly, the sentences received their validity only when integrated with the picture. After each combination, participants worked on an independent task, where they responded as quickly and accurately as possible to the probe word "right" or "wrong" via keypresses. We analyzed reaction times and error rates ($N = 146$) with two separate linear mixed-effects models. Both models revealed a significant interaction between validity and probe word. For the reaction time data, planned comparisons revealed significantly faster reaction times for the probe word "right" than for the probe word "wrong" after valid sentence-picture combinations, $p < .001$. For the error rates, planned comparisons showed significantly more errors for the probe word "right" than for the probe word "wrong" after invalid sentence-picture combinations, $p < .01$. These results provide evidence for automatic integration and validation of text-picture combinations. As next step, we want to investigate if combinations of longer text segments and pictures are also validated automatically.

The ABC of (dis)trust in science

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Trust in science—across all political camps—is crucial for modern societies. However, previous work suggests that a conservative ideology may, in general, be detrimental to trusting science. Here, we challenge the idea that any specific ideology is necessarily connected to (dis)trusting science. Instead, we argue that, across the political spectrum, trust and distrust in science result from specific stereotypes about scientists. Building on the ABC model of stereotypes about groups, we hypothesize that people hold spontaneous stereotypes about scientists' political beliefs, which are compared to one's own political beliefs. This comparison is, then, used to decide whether to trust or distrust scientists. Put simply, we assume that people trust scientists when they believe that scientists have a similar political ideology to themselves. A first experiment ($N = 200$ US Americans), in which we manipulated scientists' perceived ideology (conservative versus liberal) fully supports this hypothesis. When scientists were perceived to be liberal, liberal participants reported greater trust in science, similar to previous findings. However, when scientists were perceived to be conservative, this effect fully reversed and now conservative participants showed greater trust in science. These findings suggest that stereotypic beliefs about scientists' ideology may strongly matter for trust in science. As the next step, we are now running a series of four additional studies to explore the potential boundaries and consequences of our findings (e.g., for the perception of specific scientific disciplines).

The acquisition of affective meaning: A Brunswikian sampling approach

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The theory of affective meaning as proposed by Osgood et al. (1957) posits that the affective ecology of humans is shaped by three major dimensions—evaluation, potency, and activity—also known as EPA dimensions. Previous research has demonstrated that these dimensions largely account for a broad spectrum of affective experiences and has accumulated evidence for the robustness of the impact of the EPA dimensions for learning of affective meaning. However, so far previous research mostly concentrated on the investigation of a single or a subset of dimensions, did not disentangle confounded learning procedures, and only relied on the usage of restricted orthodox designs that do not consider the skewed distribution of the EPA dimensions in affective space. I present work in which I addressed these issues (Richter & Hütter, 2021). First, I employed a Brunswikian sampling procedure to select stimuli that allow for the implementation of a representative design, which acknowledges the natural relationships of the EPA dimensions in affective space. Second, I report two experiments that show how basic learning procedures—stimulus pairing versus stimulus exposure—differentially instigate the learning of affective meaning. Stimulus pairing elicited the learning of evaluation and activity, whereas stimulus exposure elicited the learning of potency and activity. I embed these findings in contemporary emotion theories, discuss implications for attitude learning, and reflect on epistemic and meta-theoretical aspects of this research. Finally, I argue that representative design enriches our methodological toolbox and inspires innovative theoretical accounts and the deduction of novel hypotheses that support a psychological science that is original and creative.

The affective "aha!" – a dynamic approach to pleasure through sense-making

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We are constantly exploring structures in search of meaningful patterns, and this process of dynamic sense-making could be pleasurable in itself. Several studies tested this basic idea and revealed two main effects. First, gaining perceptual insight induces an "Aesthetic Aha": Liking evaluations increased after discovering a concealed Gestalt in Mooney patterns ($N = 30$; repeated evaluations of each image) or in artistic stop-motion movies ($N = 28$; continuous evaluations via a slider). Second, interest might rather qualify a challenge or unfulfilled promise of gaining an "Aesthetic Aha" experience, motivating deeper engagement: Indeed, interest already increased before detecting a Gestalt in the stop-motion movies mentioned above. And in even another study, interesting mosaic-patterns were arranged in a more complex and/or non-obvious order than those being liked (Study 1: $N = 20$; Study 2: $N = 25$). Here we used ratings of complexity, interest and liking as well as the time people needed to decide whether the image contains

an order (as a measure of non-obviousness of order). These findings call for a dynamic approach to pleasure through sense-making. Meanwhile, it is an open question to which extent they are influenced by artistic or task-related contexts. Moreover, it is unclear whether the "Aesthetic Aha" effect is strictly refined to Gestalt detection or whether it can also be elicited by more unstable, ambivalent or abstract cases of sense-making.

The affective nature of task switching as a window into effort-based decision making

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It is a seminal observation that task switching comes with a performance cost (i.e., switch cost), but recent cost-benefit decision frameworks suggest that task switching also comes with an affective cost (i.e., task switching is experienced as a negative event). By using a task switching paradigm based on transition cues combined with an affective priming paradigm, we were able to measure the affective nature of the cue associated with the task alternation process relative to the cue associated with the task repetition process. In two pre-registered studies, we found evidence that task alternation cues were implicitly evaluated as more negative than task repetition cues. Next, we show that individual differences in the negative evaluation of task switch cues predict voluntary task switching behavior. Specifically, we found that a more negative evaluation of task switching cues was related to lower switch rates in a voluntary task switching paradigm. This finding supports neuroeconomic theories of value-based decision making which suggest that people use their subjective value of task switching to decide whether they spend the effort to switch between different tasks.

The blurring technique in experiments: A measure for sensitive versus non-sensitive contexts

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With the blurring technique (Joinson et al., 2008) participants are asked to provide their answer as a range. We present three Web experiments, in which we applied the blurring technique to the allocation of monetary and temporal resources in hypothetical scenarios. Participants describe their choices with a greater spectrum of possibilities and with a different degree of granularity in providing information considered sensitive. A comparison is made with regard to the measured content (money vs time) and the type of response possible (open- and closed-ended answers, options provided). We make a direct comparison between text boxes and drop-down menus to assess if and how these response formats differ in their impact on the degree of self-disclosure. In addition to manipulating the domain and the type of response format we also manipulate the level of sensitivity to investigate boundary conditions for the blurring technique. After discussing the results we provide guidelines for the optimal treatment of questions with different degrees of sensitivity. Results will also be discussed in order to provide recommendations

on the circumstances, in which it is good to apply the blurring technique via the use of open- or closed-ended options.

The cognitive penetrability of representational momentum effects by unrelated factors

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Our cognition represents the physical momentum of an object, called representational momentum. When individuals are shown a moving target which is then occluded, they tend to misremember it as further along its trajectory, with a distance between the true and remembered position (this distance being called displacement). It has been demonstrated that this effect is cognitively penetrable, changing when manipulating factors such as weight or velocity of the target. Yet, so far studies have focused solely on manipulating factors also related to momentum in our physical world. The current study tests the hypothesis that representational momentum can be altered by manipulating qualities unrelated to physical momentum; for instance, recent success of the target. We hypothesise that a target perceived as 'successful' will result in larger displacement, because success is conceptualised as 'progress' and 'forward impulse'. In an online study using a randomized within-subjects design, 120 participants (60 per condition, from online participant pool Prolific) watch a 3-second video of a football player either scoring (successful, 12 trials) or missing a penalty kick (unsuccessful, 12 trials), followed by a 4-second video of this player running. This video is then occluded and participants are asked to indicate the final position of the player by moving a slider to what they remember as the final frame of the video. The outcome measure is the number of frames between true and remembered frame. Significance of this research are theoretical implications for visual cognition research on invariant representations, as well as support for a notion from ecological cognitive approaches, that environmental constraints form our cognition.

The critical role of spatial memory for re-reading

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Going back to locations left of the current fixation is an essential part of skilled reading, necessary to recover from problems in word processing or to address issues in comprehension. We examined how such long-term regressive eye movements are planned and to what extend they rely on spatial memory for previously fixated locations. Incorrect specification of saccade targets leads to over- or undershooting of primary regressions, followed by corrective movements. We examined inter-individual differences in such local fixation patterns, providing the first comprehensive description of oculomotor regression strategies. German 4th grade students (mean age 9.11 years) and fluent adult readers read single line sentences containing a target word close to the beginning or end of the sentence. To elicit regressions to near and far targets, they were asked to check target words for a spelling error, which was present in 50 percent of the trials. In addition, par-

ticipants were tested with assessments for reading performance and visuo-spatial memory. Spatial memory had a substantial influence on regression accuracy. In both groups, high performers in spatial memory tests showed the highest proportion of single shot regressions, needing only one accurate long-range regression to hit the target. In contrast, lower performing participants tended to rely on search strategies, executing multiple regressive saccades until attaining the target. Adults are more effective in correcting incorrect landing positions of primary regressions than children, and needing fewer consecutive regressions and less time for the corrective process. Interestingly, reading performance only guided the correction of over-or undershooting regressions but not the programming of long-range regressions itself.

The duration of spatially crowded stimuli is perceived as shorter

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Crowding, the main limiting factor in peripheral vision, is the reduced recognition of stimuli surrounded by nearby flankers (Bouma, 1970). Here we are interested in how this impairment is related to duration estimation as another perceptual quality, since it was shown that stimulus eccentricity decreases perceived duration (Kliegl & Huckauf, 2014). To investigate this, we manipulated recognizability of peripheral stimuli by visual crowding. If low level features (e.g., density, size) determine time estimation, one would assume overestimation of flanked compared to isolated stimuli. If higher level visual processing determines time estimation, one would assume temporal underestimation of the flanked stimulus, due to reduced recognition. Twelve participants performed a dual task consisting of estimating duration of and recognizing a target letter. First, they indicated whether the duration of a comparison stimulus of varying duration was shorter or longer than a centrally presented standard stimulus of constant duration. Comparison stimuli were presented isolated or flanked with a small or large target-to-flanker spacing in 3° or 9° of eccentricity horizontally. Afterwards, they had to identify the target letter. An eye tracker ensured fixation. Results confirmed manipulation of crowding: letter recognition for flanked targets was significantly reduced. Conversely, there was a significant duration underestimation of flanked targets. Thus, perceived duration seems to be compressed by impaired stimulus recognition. Interestingly, there was no significant effect of eccentricity on perceived duration. In a follow-up study the role of task focus for the present findings will be investigated by performing letter identification and duration estimation in single task settings.

The effect of cognitive load on cooperation and moral punishment

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The present study served to test how cooperation and moral punishment are affected

by cognitive load. The intuitive-morality view predicts that the availability of cognitive resources leads to more economically rational behavior, which implies that moral behaviors should increase under cognitive load. Cooperation and punishment were examined in a simultaneous Prisoner's Dilemma game with a punishment option. The players decided to cooperate or defect and then had the opportunity to punish their partners. In the cognitive-load condition, participants had to concurrently perform a continuous tone classification task. Participants in the no-load condition had no distractor task. The multinomial cooperation-and-punishment model was used to separately measure cooperation and different forms of punishment. The probability of cooperation and moral punishment was decreased in the cognitive-load condition compared to the no-load condition. Hypocritical and antisocial punishment were not affected by cognitive load. Cognitive load was associated with an increased bias to punish the partners, suggesting that punishment was applied less purposefully under cognitive load. These findings indicate that cognitive resources do not always have a suppressive effect on moral behaviors but can facilitate cooperation and moral punishment.

The effect of diagnostic advice on clinical decision-making

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Artificial intelligence (AI) enabled clinical decision support systems are becoming more widespread in several medical fields, including radiology. However, comparatively little research has been conducted to evaluate the effect of such systems on physicians' judgment and clinical decision-making. In two pre-registered experiments, 256 and 223 physicians with varying task expertise received eight patient cases with chest x-rays and diagnostic advice. The advice was generated by human experts but labeled as coming either from an AI system or a human radiologist. Additionally, in Experiment 1, the advice's accuracy (correct vs. incorrect), and in Experiment 2, the advice's level of explainability (annotation vs. no annotation) were manipulated as within-subjects variables. In both experiments, participants were asked to evaluate the advice's quality and make a final diagnosis for each patient case. In Experiment 1, task experts rated the quality of advice lower when it came from an AI system, whereas non-task experts did not differentiate between the two sources of advice. Furthermore, the diagnostic performance was significantly worse when participants received inaccurate advice, regardless of the source of advice and task expertise. In Experiment 2, for which the data was collected two years later, neither the source nor the level of explainability of the advice affected the quality rating of the advice and diagnostic performance. However, even though all provided advice was correct in Experiment 2, the diagnostic performance was far from ideal. This work raises important considerations for the deployment of AI-generated advice in clinical settings.

The effect of inertial constraints on anticipation skill

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The aim of this study was to systematically investigate the influence of inertial factors on anticipation ability in order to gain a better understanding of the perception process. Fifteen experienced football players (6 goalkeepers; $M_{\text{age}} = 23.07$ years, $M_{\text{experience}} = 14.87$ years) and fifteen novices ($M_{\text{age}} = 24.13$ years) were asked to determine the shooting direction of penalty kicks occluded 160ms, 80ms before, at ball-foot contact, or 80ms after. Inertial conditions were manipulated by loading the kicking leg with a 2.25kg weight on the shank. Shot direction accuracy, response time, and decision confidence were recorded for anticipation performance. To ensure representativeness, game-like reaction movements and response times were implemented. It was found that loaded kick directions were anticipated more accurately ($p < .001$, $\eta^2 = .415$), faster ($p < .033$, $\eta^2 = .134$), and at earlier occlusion points ($p = .008$, $\eta^2 = .283$) than unloaded kicks. The higher accuracy for the loaded kicks was found in the earlier occlusion conditions in experts compared to novices ($p = .003$, $\eta^2 = .267$), as were the positive relationships between accuracy and confidence. As predicted, the loading of the kicking leg led to greater anticipation of kick direction. Presumably, the perception of the inertial constraints of the shot allowed for earlier anticipation of the direction of the shot. It is suggested that perception of the inertial constraints allows the anticipator to be aware of the reduced possible outcomes of the left/right action as the kick evolves. Radius of gyration in the proximal to distal development of segmental connections is suggested as a potential informational property that may be used to anticipate action outcomes in striking and throwing sports.

The effect of transcutaneous vagus nerve stimulation (tVNS) on cognitive control in multitasking

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Performing two tasks at the same time (dual-tasking) leads to performance decrements. This performance decline has been attributed to between task interference due to simultaneously occurring stimulus response translation processes. In the context of parallel processing, prioritizing of Task 1 has been found to reduce dual-task interference. This is thought to be realized by cognitive control, where Task 1 is shielded against interference of the additional Task 2. To enable task-shielding, the attentional focus shifts on the primary task, whereby the irrelevant distractor stimulus is less processed through perceptional selection. Narrowing the attentional focus on one task at a time enhances specific stimulus-response binding, which is thought to be mediated by norepinephrine release. Under the assumption of heightened task-shielding due to norepinephrine release, we applied a non-invasive transcutaneous auricular vagus nerve stimulation (tVNS) to amplify brain related norepinephrine release, while participants underwent a dual-task paradigm designed to assess between-task interference. In a single-blinded, sham-controlled, within-

subject design, we assessed the effects of tVNS on between-task interference, as well as on physiological and subjective psychological states (i.e. heart-rate variability, salivary alpha amylase, arousal) over three cognitive test-blocks. The behavioral data showed a significant increase of between-task interference under tVNS compared to sham stimulation in the first test-block of the dual-task paradigm. This finding suggests that tVNS led to a more integrated dual-task processing early during stimulation due to a transient widening of the attentional focus and a brief reduction of cognitive control.

The effects of context on the importance of user values in human-computer-interaction

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Considering user values in software development has a variety of positive effects. Values motivate users to use software, increase customer loyalty and the social acceptance of technologies. Theoretical approaches like Value Sensitive Design (VSD) propose 12 user values for software development. We conducted an online experiment with 128 participants that aimed to answer three research questions. First, which user values should be considered in software applications (absolute relevance)? Second, how do users prioritize these values (relative relevance)? Third, are users willing to accept additional efforts to support values in software development (cost acceptance)? Participants were randomly assigned to one of four conditions (IV 1, between-subjects) email program, social network, search engine, online marketplace reading 12 vignettes (IV 2, within-subjects), each capturing one of the VSD-values in randomized order. Four items for each vignette assessed the absolute relevance of values on a 7-point Likert Scale ranging from 1 "do not agree at all" to 7 "completely agree", and two items assessed their willingness to accept costs. Finally, participants ranked the 12 values concerning their relative importance. Results revealed significant differences in the absolute relevance of user values, with higher relevance of "privacy", "trust", and "sustainability". "Courtesy" and "calmness" were evaluated as comparatively less relevant. The ranking task confirmed these results. We also obtained significant differences in the importance of values between conditions. Finally, participants were willing to accept costs for considering their values in software products. Based on these findings, we conclude that user values should be considered in software applications.

The effects of perceptual disfluency on predicted, actual and false memory for a misinformation paradigm

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Perceptual disfluency can affect both metacognitive judgments and actual memory performance. In a set of two experiments, we investigated how participants may integrate information from a misinformation phase when they encountered perceptually disfluent information in the original encoding phase for witnessed events. In the original encoding

session, participants were exposed to eight stories with fifty images each. Half of the stories were presented in a fluent condition with intact pictures, whereas the other half were presented in a disfluent condition, masked with a checkerboard pattern. In the misinformation phase, they were shown all the stories again in their intact form with some of the details changed. In the test session, participants completed a multiple-choice recognition memory test, retrieving details from the original encoding phase. For Experiment 1, the results revealed more accurate retrieval for fluent than disfluent stories. Moreover, the misinformation manipulation created a significant amount of false memories; yet, the effect of the perceptual disfluency manipulation on integration of misinformation to the original story was not significant. For Experiment 2, participants also provided metacognitive memory judgments in both encoding and misinformation phases. In terms of actual and false memory performance, the findings were similar to Experiment 1. In terms of metacognitive judgments, participants produced higher memory predictions for fluent than disfluent stories, in line with their actual memory performance. The current study might have implications for eyewitness memory for both actual and predicted memory performance, especially when participants cannot perceive the information at original encoding phase clearly.

The formation and consolidation of spatial memories in children and adults

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Spatial memories like episodic memories rely on spatiotemporal associations and the hippocampus as a hub region. Spatial representations can be categorized as self-centred (egocentric) versus object-centred (allocentric). Egocentric representations involve episodic memories e.g., when remembering a previously travelled path as a sequence of left and right turns. Allocentric representations are episodic in the sense that they may involve detailed object-to-object-relations. The long-term consolidation of episodic and spatial representations is accelerated by prior knowledge in the form of schemas. Personal life experience defines the schema strength and may impact memory encoding, consolidation, and retrieval. In our study, we assess the formation and consolidation of spatial memories over a two-week period in three age groups. Our sample consists of 6- to 7-year-old children, 9- to 10-year-old children and 18- to 35-year-old adults. We use a behavioural spatial navigation task, where participants remember goal locations in a virtual maze, and we probe their memories in egocentric and allocentric conditions. Our preliminary results show better performance with increasing age in egocentric and allocentric spatial learning. Regarding consolidation, children in both age groups forget relatively more than adults over the two-week period. Overall, older study participants showed a superior ability to form and consolidate spatial memories. This may be due advanced brain maturation, more prior experience with spatial navigation situations, and availability of stronger pre-existing spatial schemas to build upon and consolidate faster.

The full-body illusion changes visual depth perception

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In this study, we asked whether space perception is embodied. To dissociate real and apparent body position, we used the full-body illusion (FBI). In the FBI subjects see an avatar being stroked simultaneously to stroking that they experience on their real physical back. Under the illusion, subjects report a forward drift in self-location (compatible with drifts reported in out-of-body experiences). We investigated whether this illusion-induced forward drift in self-location affects where subjects see objects in depth. In localization trials, participants saw a single sphere, presented briefly in front of them, either on the left or on the right side. They were asked to estimate the distance of the sphere with a verbal response. After induction of the illusion, spheres presented on the left side were perceived as further in depth. Spheres on the right side however were perceived veridically. The asymmetric manifestation of the spatial distortion on the left side allowed us to apply a psychometric measurement in which subjects compared the position of a probe against a reference sphere. Two spheres were briefly presented simultaneously and participants had to decide in a 2AFC task which of the two they perceived closer to themselves. After the induction of the FBI, we found a significant misestimation of the relative depth of the spheres. Our results suggest that the FBI distorts space perception. This result reinforces claims that depth perception is embodied. In our study, changes in the felt position of the body in space (the bodily self) – as induced by the FBI – modified where subjects saw objects in depth. We conclude that the felt position of the body is taken into account when localizing objects in space.

The gamma model analysis – introducing a scoring method of event-related potentials

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Research using the event-related potential (ERP) method to investigate cognitive processes has usually focused on the analysis of either individual peaks or the area under the curve as components of interest. These approaches, however, do not analyse or describe the substantial variation in size and shape across the entire individual waveforms. Here we show that the precision of ERP analyses can be improved by fitting gamma functions to components of interest. Gamma model analyses provide time-dependent and shape-related information about the component, such as the component's rise and decline. We demonstrated the advantages of the gamma model analysis in a simulation study and a force production task. The gamma model parameters were sensitive to experimental variations, as well as variations in behavioural parameters. Gamma model analyses provide researchers with additional reliable indicators about the shape of an ERP component's waveform, which previous analytical techniques could not. This approach, therefore, provides a novel toolset to better understand the exact relationship between ERP components, behaviour and cognition.

The hindsight bias on judgments of learning is not reduced by warnings or incentives

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Once people acquire outcome knowledge, they tend to overestimate in hindsight what they knew in foresight. This hindsight bias could be demonstrated for a variety of judgments and could recently also be shown for judgments of learning (JOLs). The two current experiments tested whether the hindsight bias on JOLs can be reduced by two different debiasing methods: warnings and incentives. Both experiments started with a learning phase, in which participants studied word pairs and made JOLs. Afterwards, participants acquired outcome knowledge for half the items by completing a memory test prior to recollecting their original JOLs. In Experiment 1, one group of participants received a detailed description about the hindsight bias on JOLs and instructions to avoid it before recollecting their JOLs, whereas another group did not. In Experiment 2, we incentivized correct JOL recollections by monetary bonuses. Both experiments revealed that, for word pairs with outcome knowledge, recollected JOLs were closer to people's actual memory performance. This hindsight bias on JOLs was unaffected by warnings and incentives, with Bayesian analyses providing evidence that neither debiasing method attenuated the hindsight bias on JOLs. These findings suggests that the hindsight bias on JOLs is due to cognitive rather than motivational processes.

The hunger hormone ghrelin influences social touch experience

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Animal research has shown that the administration of the "hunger hormone" ghrelin increases appetitive behaviour also for non-food rewards such as alcohol, heroin, and social interaction. In humans, ghrelin levels correlate with alcohol craving and odour pleasantness. Thus, the current functional neuroimaging study investigated whether the experience of social touch and its underlying brain activation are influenced by varying ghrelin levels Sixty-seven volunteers (21 women) received gentle brush stroking on the shin once fasted, and once following a standardized meal. All rated the pleasantness of very slow, caress-like (social), and fast touch. For 45 participants (11 women), 3T fMRI data were available. Ghrelin levels were collected from blood. Ghrelin values were significantly increased following the meal than the fast. Social touch was rated as most pleasant; and overall, touch was rated as more pleasant when participants had eaten. Higher ghrelin values were associated with less pleasant touch experiences in particular for the fast stroking. Applying a region-of-interest approach, we observed that the more participants activated medial orbitofrontal cortex (mOFC) after eating than fasting, the more they reported to enjoy social touch after eating than fasting. In turn, this mOFC activation increase was related to larger ghrelin differences. This indicates that social reward valuation indexed by mOFC activation seems to be hampered by high ghrelin levels. Overall, our results suggest that high ghrelin levels reduce the rewarding experience of social touch, and that this change in value is tracked by the mOFC. This might happen

to encourage behaviours that re-establish metabolic homeostasis (i.e., searching for food) instead of hedonic experiences.

The impact of counter-stereotypical exposure on automatic stereotyping depends on validity information

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Whereas automatic stereotyping is typically attributed to the activation of associations, we recently proposed that it depends on the activation of propositional representations. We tested the crucial prediction of the propositional perspective that validity information can moderate automatic stereotyping. More specifically, we examined whether the effectiveness of exposure to counter-stereotypical individuals, a well-studied intervention to reduce automatic stereotyping, is moderated by validity information. A pilot study established an intervention that influenced automatic stereotyping through exposure to descriptions of women in leadership and men in supporter positions (i.e., counter-stereotypical exposure) or vice versa. A pre-registered experiment ($N = 377$) found that the effect of this intervention was moderated by information about the accuracy of these descriptions (i.e., validity information). We discuss how these findings can inform research on automatic stereotyping and interventions aimed at reducing such stereotyping.

The impact of target and distractor duration on conflict resolution – insights from the accessory Simon task

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Lateralized responses to central targets are faster when a distractor is presented ipsilaterally as compared with contralaterally to the response. This so-called Accessory Simon Effect (ASE) decreases and even reverses when the time between distractor and target increases, suggesting that irrelevant spatial codes are inhibited and thereby less available for some time. Apart from inhibition, facilitated processing of target information might also reduce the impact of spatial distractors on behavior. In this vein, the present study investigated the effect of target and distractor duration on the time course of conflict resolution in a visual accessory Simon task. A lateralized distractor either occurred prior to or simultaneously with the target. Targets were presented briefly (Experiment 1) or persisted until the response (Experiment 2). Within each experiment, distractor duration (brief vs. persistent until response) was varied between participants. In addition to averaged response times and error rates, distribution analyses were performed to further elucidate the development of the ASE over time. The results revealed that the time course of the ASE is determined by the interplay between distractor and target duration: The ASE decreased with increasing SOAs in both experiments, but its time course was solely affected by distractor duration in Experiment 1. Specifically, the ASE in Experiment 1 quickly diminished over time and reversed with brief, but not persistent distractors. With persisting target information in Experiment 2, the ASE decreased in a similar fash-

ion with both distractor durations. Together, the findings indicate that (1) inhibition operates on irrelevant spatial codes and (2) continuous target activation contributes to conflict resolution.

The Implicit Attribute Classification Task (IMPACT) – a new method for investigating automatic appraisals of multidimensional stimuli

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Past research has demonstrated the important influence automatic appraisals have on a wide range of behaviours, including social interactions, risk taking, consumption choices, and addiction. A widely-used approach in the automatic cognition literature is to measure singular and/or generic appraisals. For example, one of the most commonly used automatic measures, the Implicit Association Test (IAT), assesses one evaluative dimension at a time. However, stimuli typically vary on multiple dimensions simultaneously, raising questions about the appropriateness and ecological validity of this unidimensional approach. To address this issue, we developed the Implicit Attribute Classification Task (IMPACT), a novel implicit measure that allows for the measurement of multiple automatic appraisal dimensions simultaneously and further eliminates both block order effects and the need for target reference categories. Here, we will present results of a study in which we compare the internal and external validity of the IMPACT and the IAT. This work provides a more nuanced approach to measuring automatic appraisals that takes into account the multidimensional nature of even simple stimuli, and has the potential to further our understanding of the influence automatic appraisals have on behaviour.

The importance of relational spatial information for scene classification

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When identifying scenes and grasping their content, we rely not only on global scene properties or visual features of individual objects, but also on their placement in the scene relative to each other. Indeed, scene grammar informs about the probability of finding certain objects in scenes, their co-occurrence, their distance (close or far apart) and relational (e.g., "X on top of Y", "X inside Y") placement. What information is sufficient for scene categorization? In a series of online experiments, we asked participants to classify 3D-modelled scenes (8 scene categories with 10 exemplars each). To obtain a performance baseline, Experiment 1 measured scene classification performance of the fully-rendered scenes (original meshes, textures and lighting). In Experiment 2, we calculated the minimum oriented bounding box (OBB) for all objects within a scene. We then generated new 3D scenes where the OBBs had replaced the original objects, i.e. their textures and shapes were missing, but the objects' general extent in the three dimensions, their relative size and location in the scenes remained. Finally in Experiment 3, we re-

placed OBBs with spheres of uniform size, thus eliminating all visual information related to an object, leaving only information about their relative placements within the scenes. In both Experiments 2 and 3, participants viewed the reduced 3D scenes from a bird's eye view for two full rotations during seven seconds. As expected, accuracy dropped as we removed visual information from scenes. But, in all three cases classification performance was above chance, i.e. even when all object information was replaced by uniform spheres. Our results demonstrate that observers were able to deduce scene categories with very sparse, visuo-spatial information.

The influence of experimental context on representational momentum

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Representational Momentum (RM) is a robust phenomenon in which the final location of an (implied) motion sequence is systematically overestimated in motion direction and has been observed in vision, audition, and lately, also in touch. Interestingly, tactile RM studies typically use a different experimental context than non-tactile studies, that is, non-motion stimuli (which don't imply any consistent motion) are intermixed with motion stimuli, whereas in visual experiments, mostly only motion stimuli are presented. Therefore, in this experimental series, we systematically investigated the influence of local (trial N-1) as well as global (proportion of motion and control trials within one experimental block) experimental context on visual RM. The results indicate that global context has a strong influence on the RM phenomenon, whereas local context does not. That is, a motion sequence for which a robust RM phenomenon is observed when presented in isolation, results in decreased or even no overestimation when intermixed with non-motion stimuli. The results are discussed in light of recent theoretical developments in the field.

The influence of gravity on perceived travel distance in virtual reality

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Humans combine vision, audition, touch, proprioception and the vestibular sense to navigate and interact with the world. Accurately perceiving self-motion requires distinguishing self-generated acceleration from that of gravity, a process that evolved and developed in 1g. Changes from 1g result in systematic errors in perception and action. Although many perceptual consequences of exposure to microgravity (micro-g) can lead to mission-threatening errors, perhaps none is more immediate and critical than misinterpreting self-motion. Understanding the perception of self-motion under unusual gravity conditions is thus key to continuing mission safety and developing future training regimes. Moving in a controlled way in a confined μg environment (full of sensitive equipment) is

a challenge that we have overcome by simulating self-motion using Virtual Reality (VR). Here, we present preliminary results on the effect of exposure to different gravity states on processing visual motion viewed using VR. Participants were tested under three g-states during parabolic flights – level flight (lf), hyper-g (hg) & micro-g. They either lay supine (lf and hg) or free-floating (μg). Participants wore a head-mounted display presenting optic flow that elicited perceived forward self-motion. We measured the perception of "travel distance" within a simulated egocentrically upright, visual environment. Participants performed two tasks, "Move-to-Target" and "Adjust-Target", in each gravity state. Data collected so far ($n = 18$) show a tendency for judgements to differ between the two tasks. There were significant differences between the perceived travel distance evoked in each task as a function of gravity state revealing that human self-motion perception evoked in VR depends on the gravity state.

The influence of urban infrastructure design on perceived safety and the motivation for active mobility

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The promotion of active mobility (i.e., cycling, walking) is a widespread goal of our time. However, perceived safety often seems to be the most important factor in the decision (not) to cycle (Hull & O'Holleran, 2014; Winters et al., 2011). Therefore, many cities are investing in the development of infrastructure for cyclists and pedestrians, as the presence of cycle paths and footpaths is often seen as an important factor to ensure safety (Moudon et al., 2005; Southworth, 2005). The aim of the present study was to investigate the influence of urban infrastructure design on participants' perceived safety and their motivation to cycle and/or walk. To this end, an online questionnaire study was conducted. In a within-subject design, $N = 74$ participants rated urban spaces before (low infrastructure quality) and after an appropriate infrastructure redesign (high infrastructure quality). 85.1% of the participants were women. The sample had a mean age of $M = 22.6$ years ($SD = 6.46$ years, $Min = 18$ years, $Max = 58$ years). Results show that urban spaces with high-quality cycling and walking infrastructures were rated with a significantly higher perceived safety ($t(73) = 11.68$, $p < .001$, $d = 1.35$) and a significantly higher motivation to cycle and/or walk ($t(73) = 23.47$, $p < .001$, $d = 2.71$). None of the effects found were confounded by participants' demographic characteristics or their reported perceived influence of the Corona pandemic (all $p > .120$). Although the sample was not representative, the results of the study suggest that positive safety impacts can be expected if urban spaces are tailored to human needs and active mobility can be promoted through an appropriate infrastructure design.

The mediating role of error attribution in the relationship between fidelity and sensorimotor adaptation in virtual reality

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When sensory discrepancies occur in virtual reality (VR) such as a visual displacement, people adapt to these changes. Once the visual displacement has disappeared again, people show a movement error in the opposite direction, which is called after-effect. Adaptation and thus the strength and persistence of the after-effect depend on various factors. Previous research has shown that higher fidelity of VR leads to greater adaptation. The aim of this study is to find out by which mechanism fidelity influences the strength and persistence of an after-effect. One possible explanation listed in the literature is error attribution. According to this, the adaptation in VR with higher fidelity is stronger because people attribute the movement error more to themselves and less to external sources such as the VR. In order to test this explanation, participants were assigned to one of three groups: control group, fidelity group and framing group. In the fidelity group, the fidelity was reduced by replacing the virtual hand with an arrow. Participants in the framing group were given the misinformation that in addition to the visual displacement, a random error component was added to the movement. Participants in the control group saw a virtual hand and received no misinformation. All three groups completed the paradigm of sensorimotor adaptation in VR. After the VR experience, error attribution was measured using questionnaires. It was hypothesised that both the fidelity and framing groups would show a smaller after-effect compared to the control group and that this effect would be mediated by the error attribution. The hypotheses could only be partially confirmed. We discuss our results with respect to the assumption of error attribution and possible implications.

The more we know, the more we cooperate: The effect of shared group memberships on cooperation

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While the human psychological tendency to adopt an "us versus them" perspective has been fueling cooperating more readily with the in-group as compared to out-group members, the natural heterogeneity of social identities allows untapped opportunities for cooperation. Because people have multiple social identities, these identities tend to match across categories even though they may diverge in others. In the current line of research, we investigated how people cooperate across multiple social categories. In three preregistered experiments (total $N = 1,092$) participants with varying in- and out-group identity categories were paired in incentivized one-shot Prisoner's Dilemma (PD) game. The relationship between two participants in a pair was either in-group (two shared group memberships), mixed-group (one shared and one nonshared group memberships), or out-group (two nonshared group memberships) membership. Results consistently showed

that cooperation increases with the number of shared group membership both in experimentally created groups (Experiment 1) and naturally existing groups (Experiments 2 & 3), and the effect of the shared group membership on cooperation was mediated by the identification with the interaction partner but not mediated by the expected cooperation from the interaction partner. The consistency among experiments suggest that the results are not driven by specific in-group/out-group considerations, but rather that the observed disparities in perceptions that are evoked by shared group membership.

The more you know: Schema-congruency supports familiarity-based retrieval of novel compound words. Evidence from event-related potentials

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According to the classical view, associative memory retrieval (AMR) requires recollection, i.e., the retrieval of qualitative details of a prior episode. However, there is increasing evidence that familiarity, a measure of memory strength, does also contribute to AMR under encoding conditions in which unitized representation are formed. The main goal of the present study was to investigate whether schema-based encoding of novel word pairs (novel compound words), similar to unitization encoding conditions leads to familiarity-based associative memory retrieval. In an incidental learning task, novel noun-noun compounds were shown in a semantically congruent context, enabling schema-supported processing of both compound constituents. In a neutral context condition, no such schema support was provided. As expected, associative memory performance was better for compound words preceded by a congruent context. When contrasting event-related potentials (ERPs) for hits in each condition with correct rejection ERPs (so-called old/new effects), the early old/new effect was only present in the congruent condition, whereby we found no evidence for a statistically reliable early old/new effect in the neutral condition. In line with prior associative memory studies, the early old/new effect in the congruent condition showed a posterior scalp topography, indicative for absolute familiarity, a familiarity signal, which is highly diagnostic for items, seen in an experimental setting, in which all items are newly learned. The late parietal old/new effect, the putative correlate of recollection, did not differ across conditions. Thus, familiarity does contribute to AMR when schema-supported processing is established, presumably by means of similar mechanisms as by unitization encoding.

The MySWOW project: Age-related differences in large scale, individual semantic networks and their role in cognitive aging

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Cognitive performance varies between people of different ages. One candidate driver of these differences are people's semantic representations. The My Small World of Words

(MySWOW) project seeks to shed light on the role of semantic representations in cognitive aging by means of concurrently assessing large-scale, individual-level semantic networks and cognitive performance. In a proof-of-concept study, we derived individual networks on the basis of 10,600 free associations from four younger and four older individuals and linked them to their cognitive abilities in a variety of tasks. Consistent with previous findings, the four younger and four older adults exhibited distinct macroscopic network properties: Older adults had larger network sizes, lower degrees, lower clustering coefficients, and longer shortest average path lengths. Furthermore, we observed strong links between the centrality and relatedness of words in individuals' semantic networks and their performance in each of the cognitive tasks. However, statistics derived from individual networks were not better predictors of the same individual's cognitive performance than those derived from an aggregate network created from the responses of all individuals. We identified reliability as the likely cause for the lack of specificity in the link between individuals' networks and cognitive performances. Using simulations and optimal design analysis, we determined that the reliability of free association networks can be significantly boosted by increasing the number of cue repetitions. We conclude by presenting an improved design that promises to advance our understanding of individual differences in semantic representation and their role in cognitive aging.

The oblivious nature of the aha! experience

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The Aha! experience, indicating the sudden comprehension of a perplexing problem, has fascinated scientists and laypeople alike. This peculiar phenomenon of insight entails a different problem-solving experience than solving a problem using a multistep, analytical approach (i.e., non-insight). Extant theories have been trying to grasp insight's underlying processes. One of the debates concerns the (un)conscious nature of insight. Some argue that insight and non-insight are alike and, therefore, both are expected to rely on cognitive resources to solve the problem. Others contend that insight is achieved through unconscious processes, thereby separating it from non-insight as a solution strategy independent of cognitive recourses. Across two studies, we addressed this debate by presenting participants with word puzzles solvable with both insight and non-insight. In Study 1, we examined insight under cognitive load using a dual-task paradigm. In Study 2, we continuously tracked participants' perceived nearness to the solution. The results of Study 1 showed that as cognitive load increased, non-insightful solutions required more time and were less frequent. In contrast, the behavioral performance of insightfully solved word puzzles remained unaffected. This finding was further corroborated by Study 2, showing that the trajectories of the nearness-to-solution ratings of insight displayed a discontinuous pattern, whereas those of non-insight were more incremental. This illustrates that for insight, unlike for non-insight, explicit information was lacking to guide the nearness-to-solution rating. These results indicate that insight is more reminiscent of an unconscious process than non-insight, which constitutes a conscious process.

The occurrence of miscues in decision support systems: Effects on detection performance of airport security screeners

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Decision support systems (DSS) are one type of automation that supports human information acquisition to improve decision-making. At airport security checkpoints, the use of explosives detection systems for cabin baggage (EDSCB) as a DSS support airport security screeners by highlighting areas in X-ray images that might contain explosive material. However, EDSCB are not perfectly reliable . They sometimes fail to give the correct response, resulting in three types of failures: misses, false alarms or miscues. When the EDSCB displays a miscue, screeners experience an explosives false alarm but another prohibited item (e.g. a gun or knife) is located elsewhere in the bag. The screeners potentially miss the other prohibited item, because they were too focused on the cue provided by the EDSCB. Misses and false alarms of DSS are well investigated, but hardly any studies addressed the effect of miscues on detection performance. The present study aims to examine the effects of each different failure types. We tested 115 professional airport security screeners with realistic X-ray images of cabin baggage. They were randomly assigned to three different experimental conditions: Miscue-prone, false alarm prone or multiple failures. Screeners had to detect bombs, guns and knives and were supported by EDSCB. Results show that screeners missed more knives when EDSCB miscues occurred compared to when EDSCB did not issue an alarm. Also, miscues misled screeners in thinking that X-ray images contain bombs while missing other prohibited items. We conclude that miscues of DSS have a negative impact on detection performance during a visual inspection task and that miscues are a problem to be considered when working with EDSCB at airport security checkpoints.

The Open Anchoring Quest (OpAQ): Explaining variance of the heterogeneous but large anchoring effects

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Anchoring effects are among the largest and easiest to replicate effects in social psychology. However, (a) the relationship between paradigm features (e.g., use of a comparative question or randomness of anchors) and effect sizes is mostly unknown, (b) replicability regarding findings on moderators has not yet received attention, and (c) robust personality moderators are still to be identified. To increase clarity and transparency in the field of anchoring research, we have created an open and growing dataset of item-based anchoring scores that currently contains more than 50,000 trials. We were able confirm that anchoring has very large effect sizes, $d = 0.808$, 95% CI [0.678, 0.938], $\sigma^2 = 0.141$, $N = 10,236$, $k = 173$, and (a) depends on features such as the randomness of anchors. (b) There was strong evidence that adjustment from anchors is relative, that is, larger anchor distances lead to smaller relative effects. (c) With very few exceptions, the susceptibility

to anchoring effects could not be measured reliably, indicating that previous findings of personality moderators are likely false positives. By centralizing anchoring research, we were able to (a) quantify the heterogeneity in anchoring effects and anchoring paradigms, (b) confirm past findings, such as the impact of extreme anchors, and (c) explain previous heterogeneous and non-replicable findings in personality moderator research. We invite researchers to join our efforts by submitting their data and encourage others to empty their file drawers. As of now, the OpAQ is the most comprehensive and transparent account of anchoring research and we strive for it to become the central hub of anchoring research. Data and analyses are available at https://metaanalyses.shinyapps.io/OpAQ/.

The peculiarities of error processing in multitasking situations

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A vast majority of the neuroscientific findings on error processing is based on paradigms that implement one task that requires one response to one target stimulus. Everyday life, however, is far more complex: a multitude of tasks and stimuli compete for cognitive resources. This not only impairs central processing of stimuli, it also leads to consequences on the level of response monitoring and error detection. Here, we present a number of findings from electrophysiological experiments on variants of the Psychological Refractory Paradigm, in which participants respond to two subtasks in rapid succession. Performance errors that occur within such dual-tasks lead to modulations of commonly investigated neural correlates of error processing, which would be impossible to be studied in the more reduced environments of single-task paradigms. Having observed, amongst others, a pre-activation of error monitoring by events in preceding subtasks, a strategic deferment of error awareness until completion of the whole dual-task, and a unification of error signals following simultaneous double errors, we tentatively outline an account of how the human brain can successfully detect errors in light of concurrent tasks and events.

The proactive regulation of cognitive relaxation and cognitive control – EEG correlates of congruency sequence effects in two Simon tasks

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Cognitive control involves the dynamic up- and down-regulation of the neural conflict network, with a strong focus on conflict resolution strategies in classic conflict monitoring literature (e.g., Botvinick, Cohen, & Carter, 2004). While increased shielding after incongruent trials is a robust finding interpreted as up-regulation of cognitive control in the dorsal ACC and dorsolateral PFC, the neurophysiological correlate of increased cognitive relaxation after congruent trials is still unclear. In this talk, we will first present a conceptual replication of Berger, Fischer, and Dreisbach's (2019) Simon task setting in time-frequency EEG data, showing robust response facilitation as well as response conflict in the current trial dependent on the (in)congruency of the previous trial in reaction

times, error rates and theta power increase ($4 - 8$ Hz). In a second EEG experiment, we try to replicate our preliminary findings in a contingency-confound free Simon task (Weissman, Jiang, & Egner, 2014) to control for the intertrial retrieval of stimulus and response features. Taken together, our results pinpoint the need to merge classic top-down conflict resolution and bottom-up feature integration frameworks (Dignath, Johannsen, Hommel, & Kiesel, 2019; Egner, 2014, 2017) to take cognitive conflict and cognitive relaxation strategies into a more general account including contextual binding of stimulus features to fluent control states.

The prospect of long-term implicit attitude change: Tests of spontaneous recovery and reinstatement

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Implicit (automatic) evaluations can exhibit momentarily malleability, including in the negative-to-positive direction. However, demonstrations of long-term change are exceedingly rare, especially in the context of real-world targets. In this project (N = 2,150), we rely on ideas from fear leaning to ask why even interventions that produce short-term malleability immediately tend to be ineffective in creating durable change in implicit attitudes. In Experiment 1, we identified two interventions that were particularly effective in overturning negative implicit evaluations formed about a novel social target in the short term: reinterpretation and negation + replacement. In Experiment 2, we confirmed the effectiveness of these two interventions in bringing about immediate reversals of experimentally induced negative implicit evaluations. In Experiment 3, the shifts in implicit evaluation achieved via reinterpretation and negation + replacement did not show any decrement over 2 days, thus providing evidence against spontaneous recovery. However, when the target was repeatedly paired with mildly unpleasant images 2 days after reinterpretation or negation + replacement (reinstatement), implicit evaluations became markedly negative (Experiment 4) and considerably more negative than implicit evaluations of a control target that had never been subject to implicit negativity (Experiment 5). Taken together, these data suggest that negative-to-positive changes in implicit evaluation may not be vulnerable to the mere passage of time. However, even interventions that seem to fully and durably overturn implicit negativity can leave initially encoded negative information intact and allow for such information to be expressed later, including in response to subtle reminders.

The role of distraction within errors in the information reception

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Although the number of people killed or seriously injured in a traffic accident has decreased in the last decades, Vision Zero has not yet been achieved and is therefore still the main objective of today's road safety policy. To develop suitable measures for accident

prevention it is important to understand why accidents happen. The Audi Accident Research Unit (AARU) is an interdisciplinary research project of the Regensburg University Medical Center in cooperation with Audi. The determination of the accident causation is based on the five-step method. Previous analyses have shown that the main reason why accidents happen is due to problems within the information reception. That means that the information that would have been necessary to prevent the accident was available, but was not perceived by the drivers. The purpose of this paper is to get a deeper insight into the influencing criteria that lead to errors in the information reception with a focus on the role of distraction, since distraction is often discussed as one of the main crash causations. By now there are about 1,500 in-depth analyzed accidents within the AARU database. More than fifty percent of these accidents are caused due to problems within the information reception. The main reason for an error in the information reception is due to a lack of activation (e.g., alcohol, fatigue, etc.). With more than eleven percent an inappropriate focus of attention is the second most frequent reason for an error in the information reception. Closely followed by distraction with more than ten percent. Three types of distraction can be differentiated: distraction inside the vehicle, distraction outside the vehicle and mental/emotional distraction. Of these, distraction inside the vehicle is the most common cause.

The role of language in the development of visual attention styles

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The way humans attend to their visual field differs profoundly between individuals. Previous research suggests that some people have a more analytic style, with a higher focus on the salient object of a scene, while others have a more holistic style, characterized by higher attention to a scene's contextual information. Although a general assumption in many studies has been that these attention styles are socialized in social interaction during childhood, not much work has focused on the proximal mechanisms underlying this development. We conducted two studies to investigate one potential causal factor that may shape habitualized ways of perceiving the world, namely language-based attention guidance. First, we examined whether the visual attention of 4- to 9-year-old children can be experimentally manipulated via language-based primes that accentuate either analytic or holistic processing. Results indicate that language-based priming is effective in guiding children's gaze behavior in an eye-tracking task and their verbal accounts in a picture description task, but it does not influence the way visual scenes are remembered. Following up on these results, in the second study we used a training approach to see whether language-based attention guidance in a 10-day mediabased training has the power to produce effects one day after the end of the training. Preliminary results suggest that language is effective in influencing children's attention style over a longer term, too. In concert with previous cross-cultural and correlational studies, these findings provide convergent evidence for the assumption that language plays a central role in the socialization of attention styles.

The role of objective and introspective switch costs in voluntary task choice

Jonathan Mendl & Gesine Dreisbach
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Human beings are cognitive misers. One facet of this effort avoidance is the reluctance to voluntarily switch tasks when the repetition of the same task is allowed. Yet, we repeatedly find that participants voluntarily switch despite the (switch) costs that follow from this decision. This seeming paradox might be resolved if the individual switching ability or sensitivity is considered. Here we aim to investigate to what degree the voluntary switch rate (VSR) is governed by the objective or the subjective (introspective) switch costs and where the boundaries of this introspection lie. Two experiments were conducted utilizing the (hybrid) voluntary task switching procedure that mixes forced and free task choices randomly. Objective switch costs were measured on forced tasks, the subjective switch costs were calculated from (introspectively) estimated reaction times (RT) in a separate phase in Experiment 1 ($N = 120$). The results show that only the objective switch costs predict the VSR while subjective switch costs did not further add to this effect: The lower the objective switch costs, the higher the VSR. In Experiment 2 ($N = 100$), we additionally manipulated the forced switch rate and measured the subjective switch costs within these forced choices. Results show that objective and subjective switch costs were lower in blocks with a high forced switch rate than in blocks with a low forced switch rate. However, neither of both predicted the VSR. Hence, introspection in task switching is sensitive to even subtle modulations of the task context but its role in decision-making processes has yet to be unraveled.

The role of study material for the forward testing effect

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The forward testing effect (FTE) refers to the observation that retrieval practice of previously studied information can promote learning and memory of subsequently studied information. The purpose of the present study was to investigate whether the FTE is influenced by study material. Replicating previous work, we showed that the FTE can arise both when unrelated and categorized item lists are applied. Going beyond the previous work, we found that parallel FTEs for both unrelated and categorized item lists arose only when retention intervals were short and when the lag between studying the previous lists and studying the final critical list was also short. With a prolonged retention interval or a prolonged lag, the FTE arose with categorized lists but was not observed with unrelated lists. These findings suggest a critical role of study material for the FTE and are consistent with a two-factor explanation of the FTE, which assumes contributions of both strategy change and context change for the FTE. The account proposes that the FTE is mainly driven by strategy change with categorized material and is mainly driven by context change with unrelated material.

The "said-it-all-along effect": Pragmatic, constructive and reconstructive memory influences on the hindsight bias

Karolin Salmen, Florian Ermark, & Klaus Fiedler
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After knowing how events turned out, we are quick to say "we knew it all along." Decades of research on hindsight bias have shown that outcome information biases what we later present as our original judgments. Combining established between- and within-participant designs in a longitudinal study, this research offers a new theoretical perspective that integrates pragmatic, as well as constructive, and reconstructive memory processes underlying the hindsight bias. It is found that participants successfully exclude outcome information from their judgments, even directly after giving a judgment that is biased by the outcome information. However, if the same request to exclude outcome information appears not directly after the biased response, but two weeks later, no successful exclusion occurs. After this delay, judgments on scenarios where participants last excluded outcome information remain unbiased, while judgments on scenarios that ended with biased answers two weeks prior remain biased. These results extend the reconstructive memory approach with the constructive influence of cooperatively given responses as self-generated feedback. Thereby we provide a new line of explanation for the hindsight bias.

The selection mechanism at the level of the subtasks of an interrupted task

Patricia Hirsch & Iring Koch
RWTH Aachen University

In everyday life, we are often confronted with task interruptions. In the present study, we examined the selection mechanism at the level of the subtasks of an interrupted task. To this end, we instructed subjects to perform two primary tasks which consisted of a pre-defined sequence of three subtasks (i.e., A, B, & C). In one primary task, the last subtask was a $n-1$ task repetition (e.g., ACC), whereas in the other primary task, the last subtask was a n-1 task switch (e.g., ABC). In interruption trials, an interruption task (i.e., digit categorization task) occurred before the third subtask, making the n-1 repetition of the last subtask in non-interrupted trials to an n-2 repetition of the last subtask in interrupted trials. In primary tasks with a n-1 switch in the last subtask, there was a n-2 switch of the last subtask, if an interruption was presented. We analyzed the performance in the third subtask of the primary task in two experiments. In Experiment 1, each subtask was mapped to a different response key pair, whereas in Experiment 2, there were overlapping response keys for all three subtasks. In both experiments, we observed performance to be worse in interrupted trials than in non-interrupted trials. Moreover, we found switch costs, reflecting worse performance in switch trials than in in repetition trials. The switch cost was more pronounced for non-interrupted trials (i.e., n-1 switch costs) than for interrupted trials (i.e., n-2 switch costs). Most importantly, both the n-1 and the n-2 switch costs were significant. The n-2 switch costs in interrupted trials

indicates that the activation of the pre-interruption subtask persists over time, resulting in residual positive priming.

The testing effect in the lecture hall: Does it depend on learner prerequisites?

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Julius Maximilian University of Würzburg

The benefits of practice testing for long-term learning are well established in both laboratory and field settings. In contrast, little is known about learner characteristics that might moderate the effectiveness of practice testing. Especially in real-world educational settings where learners have many degrees of freedom in how they use a learning opportunity, the effects of practice tests might depend on individual prerequisites for learning. We explored whether the effects of practice testing in a regular university lecture would depend on motivational (e.g., learning motivation), attitudinal (e.g., error orientation), emotional (test anxiety), or cognitive prerequisites (retrievability, prior knowledge). To this end, we implemented a minimal (within-subjects) intervention design that accompanied five thematic sessions of psychology lectures for teacher students ($N = 208$). One week before the lecture, focal learner characteristics were assessed. Immediately after the lecture, participants received an online review of the lecture contents that encompassed short-answer questions (practice testing) or summarizing statements (restudy), alternating within each participant. One week later, retention of learning contents was assessed with a criterial test containing short-answer and multiple-choice questions. A testing effect emerged in all lecture sessions, with better retention for the tested compared with the restudied contents ($\eta_p^2 = .074$). Also, learner characteristics positively affected learning but no interactions with testing vs. restudy occurred. These results suggest that the testing effect in the university classroom is a very robust phenomenon. Practice testing seems to benefit students irrespective of major individual learning prerequisites.

The theta rhythm in human early brain development

Moritz Köster
Free University of Berlin

The ~ 3-8Hz theta rhythm in the human EEG has long been associated with learning and memory processes. In this talk I will briefly summarize the current state of knowledge and then present our recent work on the theta rhythm in developing human brain. Most critically, across several studies we found that the theta rhythm is present from the first years of life and involved in the processing of novel and unexpected information. Thus, the theta rhythm seems to be an ontogenetically preserved learning mechanism that allows developing humans to integrate novel information into their developing (semantic) models of the world around them. This proposal is in particular supported by two studies, in which we assessed the involvement of the theta rhythm in learning processes at different developmental ages. In the first study, we found that the theta rhythm was increased for an explicit learning condition (compared to an implicit learning condition) in 5-, 7-, and

20-year-olds. However, the ~10 alpha rhythm was associated with a semantic encoding task and showed a clear developmental trajectory, possibly indexing the development of increasingly sophisticated semantic networks, built up by the theta rhythm as a learning mechanism. This idea is further supported by the second study, in which we compared the representational similarity of object representations in 9-month-old infants and adults. While young infants processed category information slowly and much less reliable, at the theta rhythm, the same information was encoded fast and reliable in the adult brain, at the alpha rhythm. Thus, the theta rhythm is an ontogenetically preserved learning mechanism in the human brain and may play a decisive role in building up efficient semantic networks in the developing human brain.

The three stages of trust framework and its application to the design of experimental studies in human-technology interaction

Johannes Kraus
Ulm University

Automated technology is becoming a part of everyday life in different domains (e.g., AI, robots, automated vehicles). Trust in automation has been shown to be a good predictor for efficient, safe and subjectively positive interactions with such systems and is therefore investigated in different psychological disciplines like I/O or engineering psychology. In this talk, on the basis of theorizing from these and related disciplines, the Three Stages of Trust framework is introduced. This framework provides an integrative approach for investigating the psychological processes in the dynamic formation and calibration of trust in automated technology with a focus on the multiple variable groups influencing these processes (e.g. person-related, situational, system-related variables). The framework differentiates three stages at which trust is formed in the process of familiarization with an automated technological system: the propensity to trust, initial learned trust and dynamic learned trust. A key advantage of this framework is a combined consideration of trust processes prior to and during the interaction with a specific technical system. In this talk, based on the theoretical foundation of this model, recommendations for the experimental investigation of trust processes in the interaction with automated technology in the different involved psychological disciplines are provided. These recommendations include the incorporation of the history-based and dynamic character of trust in study designs, measures to increase experimental standardization, requirements for the measurement of the different trust facets and a discussion of possible control variables in experimental studies.

The time course of establishing a memory trace in visual working and long-term memory

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How or why do we remember things better? For visual working memory (WM) one process that could contribute to this question is short-term consolidation. Through this

mechanism, perceptual representations, which could be easily lost, are transformed into stable WM representations, resistant to interference and decay. The time course for a WM trace to be created is estimated to take around 500-1000ms. Although it has been suggested that episodic long-term memory (eLTM) contributes to performance in many tests of WM, it is not clear whether eLTM traces are formed fast enough for that. Here, we aimed to compare the time courses of establishing visual memory traces in WM and eLTM by varying the inter-stimulus interval over a broad range, and measuring WM and eLTM with the same test method. We found that the time courses are different for the two memory systems, being slower for eLTM. Furthermore, we provide evidence that performance improvement in recall error is better explained by gradual consolidation over time than by temporal distinctiveness. Our study shows that a substantial contribution of eLTM to performance in a WM test is more likely with slower presentation rates.

There's more to life than "good" or "bad": Non-evaluative semantic stimulus relations in the evaluative decision task, revisited

Manuel Becker, Marie A. Jakob, & Karl Christoph Klauer
University of Freiburg

A recurrent debate centers on the malleability of the Evaluative Decision Task (EDT; Fazio et al., 1986) to the influence of non-evaluative semantic stimulus relations: There is little empirical agreement on whether and how evaluative and non-evaluative semantic stimulus relations (interact to) produce evaluative priming effects, and there is not even agreement on whether evaluative priming effects emerge in the absence of non-evaluative stimulus relations. An absence of priming effects in conditions where stimuli are only evaluatively related would be surprising inasmuch as it is hardly reconcilable with the dominant theories explaining evaluative priming effects via response activation. Resolving these conflicting results would thus inform theorizing on the mechanisms behind evaluative priming, and it would also have implications for sound measurement in the EDT, since in many applied studies, stimuli do not only vary on the evaluative dimension. In a first study ($N = 81$), we suggest that research on this topic so far has suffered from a confound that renders the EDT's measurement outcome difficult to interpret. In a second study ($N = 81$), we show that in a research design that does not suffer from this confound, evaluative and non-evaluative semantic stimulus relations co-determine the EDT's measurement outcome, and evaluative priming effects also emerge in the (relative) absence of non-evaluative semantic stimulus relations. We will also report results from an ongoing additional study in which only words from the semantically unrelated conditions are presented to participants.

Theta oscillations support map-based navigation

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Theta oscillations have been implicated in memory encoding and retrieval processes, in particular in the realm of spatial navigation. However, the precise mechanisms by which theta supports way-finding are not fully understood. Here, we studied the link between hippocampal theta oscillations and navigation behavior in 33 patients who were undergoing clinical seizure monitoring with intracranial EEG. Subjects navigated a virtual arena to learn the locations of eight unique objects. On each trial, they retrieved the location of a cued object by navigating to the remembered location. Subsequently, they received feedback and collected the object from its correct location. We reasoned that if subjects were exclusively using a map-based navigation strategy, they should take a straight-line path from each start location to each (presumed) target location. We observed, however, that subjects' retrieval trajectories were variable: some trajectories were straight, while others deviated from a straight-line path. We found that theta power increased whenever a subject's trajectory resembled a straight-line path and decreased on trajectories that deviated from this path. This effect held up when controlling for other variables such as speed and accuracy in final drop location. Our results suggest that theta oscillations specifically support map-based navigation, as one of several complementary navigation strategies.

To trust or to mistrust – which is the more dominant response tendency? Evidence from a dominant behavior measure (DBM)

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Are people more prone to trust or to mistrust? To answer this question we introduce a novel paradigm – the Dominant Behavior Measure (DBM). Particularly, we designed a novel trust game in which participants have to quickly decide whether to trust or mistrust a Player B according to a color, while ignoring a distractor name written in this color. The colors represent a Player B that was associated with mostly trustworthy or untrustworthy behavior. The distractor names are people the participants either trust or mistrust in real life (Experiments 1-4) or were experimentally associated with un/trustworthy Player Bs (Experient 5). Capitalizing on decades of meticulous research in basic cognitive psychology, we find that trust, similar to other dominant response tendencies (e.g., people's first language), is faster, harder to switch to, more interfering and more facilitating than mistrust. These effects are obtained in the trust and the distrust games, and when the un/trustworthiness of Player B is uncertain. We discuss the potential of the DBM to study dominant responses in manifold social as well as non-social domains.

Tracking distractor-response binding with the mouse

Philip Schmalbrock & Christian Frings
University of Trier

When responding to a stimulus, stimulus and response features are integrated into a so-called event file. When some or all features comprised in an event file repeat in a later

episode the whole event file is retrieved. When a later episode is identical to the episode in an event-file, performance benefits emerge because the previous response can be recycled without additional computations. When only some features match between previous and present episode, performance costs manifest because the conflict between previous and present response has to be resolved. The combination of these costs and benefits is termed stimulus-response binding effect (S-R binding). Previous research on S-R binding focused on key-press tasks where cost and benefits are measured as a single reaction time for each trial. However, this single value obscures several underling processes that get lost when observing responses as keypresses. Here, we present a novel adaptation of the established distractor-response binding paradigm that uses mouse movements instead of keypresses. This allows to further distinguish between a preparatory and an executive (motor) phase. We present several experiments that used this novel measure technic to delve deeper into how S-R binding is modulated.

True insights, false insights: Do aha! experiences signal solution correctness?

Amory H. Danek
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In their quest for knowledge, humans rely on insights as indications of truth. The joyful feeling of "Aha!" often leaves us with a strong sense of having arrived at a correct problem solution. But is this high level of confidence justified? This talk presents converging evidence that when the solution to a problem comes to mind accompanied by a self-reported Aha! experience, it is more accurate compared to solutions where this feeling is missing. The accuracy effect of insight has been found repeatedly and holds across task domains such as Compound Remote Associates problems, anagrams, rebus puzzles, line drawings and magic tricks. Possible explanations for this effect are discussed. The second part of the talk presents data indicating that feelings of Aha! can be misleading, too, as they also arise for incorrect ideas. Differences between true and false insights with regard to affective and metacognitive ratings are explored.

Truths and lies in an online card game: Establishing a paradigm for the investigation of lying in a social context

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Although lying is a fundamental and frequently used element in human social communication (e.g., de Paulo et al., 1996; Serota et al., 2015), it has mostly been studied within deception detection research. The cognitive processes of spoken "everyday lies" are mainly unknown. Therefore, we have developed a paradigm for online research enabling us to evoke deceptive and truthful statements in a live, online social interaction. Combining the platforms jsPsych and JATOS with a fake social context (Hauber et al., 2021), participants are made to believe they are meeting another person and are participating in a two-player picture naming card game. In this game, participants are asked to

name objects they see on their playing cards using typewritten answers. The use of spontaneous lies is not instructed, but encouraged by point gain, enabling us to predict when participants are likely to lie and, if so, which words will be produced. Reaction times and typing errors of deceptive and truthful responses are contrasted, and compared to a control condition without social context and incentive to lie. We predict that the production of lies will be slower and more error-prone than the production of truthful statements (Suchotzki et al., 2017). By combing classic paradigms from deception detection and speech production research and embedding them into a social interaction task, we believe that we have created a paradigm that enables us to study ecologically valid lies. In this talk, we will present the online experimental paradigm and provide first results.

Turning up the social dial: Generating minimal social contexts online

Miles R. A. Tufft & Daniel C. Richardson
University College London

Behaviours and their associated cognitive mechanisms do not exist in isolation but in a world that is naturally social and rich in context. As such, we are always situated within an ongoing and dynamic interplay between our actions and the contexts in which they play out. By experimentally recreating minimal social contexts while maintaining an acceptable degree of control, I systematically investigate the relationship between higher order social factors such as social hierarchies or group membership and implicit cognitive phenomena such as interference effects. Achieving this often requires manipulating participants' expectations, deceiving them into believing they are engaged in social interactions when in reality they are not. Situational believability is therefore crucial to manipulation validity. Translating this into an online environment presents a set of unique challenges that reflect the decontextualised nature of meeting online, while at the same time offering benefits in terms of control, efficiency and scalability. With examples from my recent experiments using a manual response version of the picture-word interference paradigm, I will share the methods I have used to turn up the social dial online and will compare data from lab-based versus online studies. I will also highlight my learnings on striking a balance between design complexity and situational believability to maintain online psychometric data reliability and quality.

Uncertainty explains social information use across adolescence

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Adolescents are known for their propensity to take risks, which may be especially strong in social contexts. However, in many laboratory tasks, adolescents take fewer risks than adults. This discrepancy was explained by the notion that many experiments are an inadequate proxy of the uncertainties and risks that adolescents face in real life. How subjective uncertainties develop and how they relate to the development of social susceptibility across adolescence is unknown. We, therefore, developed the marble task and

asked 165 subjects (aged 10–26) to take risks under different levels of uncertainty, either by themselves or after observing the advice of someone else. We show that risk-taking and social information use decrease across development despite uncertainty. We propose a cognitive model wherein uncertainty is a mechanism of belief change in the light of social information. This model revealed that across development, people became less uncertain about how to decide. Age-related changes in uncertainty fully accounted for age-related changes in social susceptibility. Our results imply that their uncertainties are a previously overlooked mechanism behind adolescent risk-taking and social susceptibility.

Uncovering idiosyncratic influences on judgments of learning

Monika Undorf, Sofia Navarro Báez, & Arndt Bröder
University of Mannheim

Numerous studies showed that people base predictions of their own future memory performance—judgments of learning—on general cues pertaining to the study materials (e.g., word frequency) and learning conditions (e.g., number of study opportunities). In contrast, the impact of idiosyncratic information such as the personal significance of items on judgments of learning has remained untested. We propose that idiosyncratic influences on metamemory can be measured by the nonlinear component C of Egon Brunswik's (1952) lens model. In two experiments, we made randomly chosen items personally significant (Experiment 1) or assessed the personal significance of items (Experiment 2). Personal significance increased judgments of learning and memory performance. Including personal significance as a predictor in the lens model reduced C, whereas including previous encounters with items in the experiment did not. Hence, the lens model's C parameter captures idiosyncratic influences on metamemory judgments and may serve as a useful tool for future research.

Understanding the memory-prediction error-liaison. An eye tracking study

Isabelle Ehrlich, Javier Ortiz-Tudela, & Yee Lee Shing
Goethe University Frankfurt

The reliable anticipation of the environment is one of the main tasks our brain performs continuously for us to deal with this complex world. In this respect, events that are not congruent with prior knowledge and derived expectations seem to be very important. Growing research on predictive processing suggests that a mismatch between knowledge-based predictions and sensory evidence, i.e., prediction error, can have a beneficial effect on the encoding and retrieval of the mismatching information. However, this positive effect on memory seems to be highly specific and the underlying mechanisms are not fully understood yet. The current eye-tracking study aims at further illuminating the precise requirements of such memory boosting mismatches by focusing on the multiple facets of declarative memory and the unsolved role of pattern separation as a possible mediator. In an adaptation of the classic mnemonic similarity task, we ask participants to form predictions during encoding that are eventually confirmed or violated. In a

subsequent surprise memory task, participants are presented with (in)congruent targets, (in)congruent lures, neutral objects, and foils, and indicate whether the objects are old, similar, or new. Additionally, we test for memory of the specific encoding context as well as the timepoint in which the object was encountered during the experiment. Relating pupil response patterns to these various response combinations as well as lure discrimination indices, helps us to draw a clearer picture of the complex relationship between prediction error and declarative memory.

Unity and diversity of metacognition

Mirko Lehmann[1], Jana Hagen[2], & Ulrich Ettinger[1]
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Despite many research efforts dedicated towards deciphering the functional architecture underlying metacognition, it is still unclear if there are separable metacognitive systems for different domains of function. In a large sample study ($N = 155$) employing pairs of laboratory tasks of metacognition across three experimental domains (visual perception, episodic memory, and attention to action), we examined whether metacognitive ability is determined by universal or modular processes, and whether it is related with various self-report measures of real-world metacognition. Relationships between metacognitive efficiency scores across paradigms and domains were assessed using a combination of correlational and latent variable approaches. Generally, the results point to a mixture of domain-general (unity) and domain-specific (diversity) components. Specifically, Bayesian correlation estimates of metacognitive efficiency as well as confirmatory factor analysis of inter-domain correlations suggested metacognition about perceptual judgments to be mostly domain-specific, whereas convergent indications for interrelations between metacognition in the domains of attention-to-action and memory implied the coexistence of partly specialized metacognitive subsystems. Notably, self-report measures of metacognition were unable to predict metacognitive performance in the laboratory, but represented metacognitive bias rather than efficiency, underscoring prevalent scepticism whether self-report questionnaires provide a useful proxy in metacognition research, as they appear susceptible to potentially unreliable introspections and memory distortions. The results presented in this talk therefore indicate a constitution of both universal and specialized parts for task-based metacognition.

Un/like the other? Repeated presentation attenuates intergroup face confusion asymmetry in popular social categorization tasks

Felicitas Flade & Roland Imhoff
Johannes Gutenberg University of Mainz

The other-race effect (ORE) states that other-race faces are confused more than own-race faces. The "Who said what?" Paradigm (WSW) provides rather pure measures of social categorization and individuation, which are usually equally strong for own-race and other-race faces. Both the other-race face perception task and the "Who said what?" –

Paradigm are memory-based measures based on within-race confusion. Yet, the former curiously finds an asymmetrical pattern of intergroup perception, while the latter finds a symmetrical pattern of intergroup perception. To investigate the symmetry of intra-group confusion in intergroup contexts in the ORE face perception task and the WSW paradigm, we employed a method-driven approach and made use of the paradigms' design constraints. In Study 1, we empirically explored whether there are asymmetries in intergroup categorization or individuation in a meta-analysis of studies featuring the standard WSW paradigm. In Study 2, we addressed the hypothesis that repeated presentations of category exemplars attenuate the within-race confusion asymmetry by varying the stimulus presentation repetitions in an ORE face perception task. The findings of Study 2 are underpinned by an internal mini meta-analysis of all 6 of our ORE face perception studies, featuring number of stimulus presentation repetitions and duration of stimulus presentation as moderators in a meta-regression. This research line aims to provide new insights into the symmetry and nature of within-race confusion, potentially informing the concept of social categorization. It also aims to identify potential boundary conditions constraining and processes underlying the other-race-effect.

Using a test battery to compare three remote, video-based eye-trackers

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A multitude of eye-trackers from different manufacturers is available differing in both cost and usability. The choice of device is difficult. Accuracy and precision provide a benchmark for performance. However, the parameters given by manufacturers are often recorded under perfect conditions and may not apply to lab conditions with human subjects. This preregistered study compared three remote eye-tracking devices under realistic lab conditions: The high-cost EyeLink 1000+, the largest manufacturer's medium-cost Tobii Pro X3-120, and the lesser-known, low-cost Gazepoint GP3HD Desktop. An extensive task battery adapted from Ehinger et al. (2019) was used, measuring a variety of eye-tracking parameters (e.g., accuracy, precision, different screen luminances, suboptimal head positions). Participants ($N = 24$, $M_{\text{age}} = 23.62$, 87.5% female) completed all tasks twice in randomized order with each device. Parameters were compared within-subjects with robust linear mixed models. The experiment was programmed in OpenSesame and analyzed in R. The accuracy and precision of the EyeLink were significantly better than those of the Tobii and GP (accuracy: EL $M_{\text{win}} = 0.44°$; GP $M_{\text{win}} = 1.04°$; Tobii $M_{\text{win}} = 1.23°$), also with varying brightness of the screen. For all eye-trackers, accuracy decreased over time, while precision only declined for the Tobii. Under suboptimal head positions, the GP and Tobii accuracies equaled or exceeded the EyeLink, while the EyeLink still showed the best precision. The Tobii showed better precision than the GP in one of the two position tasks. This study shows that the performance parameters in some cases match the manufacturer's and fall short in others. The low-cost GP and the medium-cost Tobii performed similarly, with both having their own strengths and weaknesses.

Using circles games to investigate the referential use of negation

Francesca Capuano, Carolin Dudschig, & Barbara Kaup
University of Tübingen

Studies on the spontaneous production of negation suggest that it can be modulated by general pragmatic principles of information content such as informativity and relevance. The present study investigates whether negation production is additionally modulated by considerations of economy. In a series of circles games, subjects were presented with pairs of circles and asked to complete a sentence that would allow a listener to identify one of the two circles. Negation was only produced when an affirmative description for the circle at issue was harder, i.e. there was no simple intuitive way to describe the circle's pattern. The length of the concurrent descriptions did not strictly influence the production of negation. Nevertheless, factors of various nature might concur to a computation of effort other than simple differences in words length. The results suggest that the use of negation becomes more frequent as the effort to produce it decreases with respect to a concurrent affirmation, even at the cost of greater adequacy of affirmation in terms of informativity.

Using drones to improve and enhance interactions and haptic feedback in mixed reality

Matthias Hoppe & Albrecht Schmidt
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Mixed Reality (Virtual Reality, Augmented Reality) systems are evolving and new technological advancements and novel interactions are created. However, one of the key aspects of interaction is often still lacking. Haptic Feedback helps not only to make input more accurate but also gives the user a better feeling and understanding of the interaction with the surrounding virtual environment. While tool-based interactions are often represented with handheld devices and vibrotactile feedback, hand-based interaction is often not possible or limited to the placement of passive haptic proxies. Therefore, we present a system utilizing drones as levitating haptic feedback proxy. A touchable surface or props are attached to the side of the drones to provide unintrusive, flexible, and programmable haptic feedback in virtual reality. Since the users' sense of presence in virtual reality is a crucial factor for the overall user experience, our system simulates haptic feedback of virtual objects. Drones are dynamically positioned to provide haptic feedback relative to the physical interaction space of the user. Haptic feedback provided by drones significantly increases users' sense of presence compared to vibrotactile controllers and interactions without additional haptic feedback. We further explored the quality of induced feedback regarding the expected feeling of different objects. Results show that hovering, non-reactive drones are best suited to simulate objects that are expected to feel either light-weight or have yielding surfaces.

Using framing and nudging to increase vaccine willingness

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Many people are hesitant or unwilling to take advantage of potentially life-saving vaccines; this is also true in a global pandemic and even when the vaccines are readily available and/or free. Besides general unwillingness to vaccinate, one of the most frequently named reasons for COVID-19 vaccine hesitancy is fear of side effects. Governments and health care organizations are eager to avail themselves of low-cost measures to increase vaccination readiness and rates. In this experimental study, we examine the efficacy of two different approaches – framing and nudging – in promoting a Covid-19 vaccine program. While nudging had no visible effects, framing was associated with more positive feelings toward the campaign and a greater intention to be vaccinated, though more so among those already pre-disposed to vaccinate. Addressing and positively framing the high likelihood of problem-free vaccinations should therefore form an integral part of public messages.

Using group work to reduce procrastination among students

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Theorizing on procrastination as well as programs to reduce it mostly focus on person-related variables and neglect situational factors, such as group work. Findings from Social Psychology and Education Research show that group as compared to individual work can increase group member's motivation and performance, if the member perceives the own contribution as indispensable for the group product. A field experiment was used to test whether this type of group work can also lead to lower procrastination of an academic task and higher task performance as compared to individual work; and to explore positive and negative task-related affect. Student participants with a high level of trait procrastination ($N = 58$, 37 female) were invited to complete an academic task over the course of ten days for a reward of €15. Instructions informed participants that they would work on the task alone (individual work condition) or as part of the group with their task representing an indispensable contribution to the group product (group work condition). We assessed procrastination of the task (using the Academic State Procrastination Inventory; Helmke & Schrader, 2000; $\alpha = .92$), whether the task was successfully completed, as well as the number of errors in the task, and positive and negative affect (using the Positive and Negative Affect Schedule; Krohne et al., 1996; $.81 < \alpha < .88$). Compared to individual work, task procrastination was lower, $t(56) = 2.16$, $p = .017$, $d = 0.59$, and the number of completed tasks was higher in group work, $\chi^2 = 5.09$, $p = .022$, $d = 0.62$. No significant differences were found regarding errors and positive and negative affect ($p < .05$). Results are discussed in the light of an innovative approach that draws on situational factors to prevent procrastination.

Using the theory of visual attention (TVA) to measure premotor attention

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Eye and hand movements are preceded by shifts of visuospatial attention towards the motor targets. Whether attention is allocated independently towards multiple effector targets during combined eye-hand movements, or whether a single attentional system underlies target selection for multiple effectors, has been debated. Independent target selection mechanisms would predict an increase of overall attention capacity with the number of active effectors, whereas a single selection mechanism would predict a fixed attention capacity and competition between effectors. Here, we directly test these two competing hypotheses using the Theory of Visual Attention (TVA; Bundesen, 1990) to measure premotor shifts of visuospatial attention. In two experiments, observers ($n = 8$) performed eye, hand, or combined eye-hand movements to centrally-cued locations and reported letters briefly presented before the execution of a saccade or reach movement. Modeling the data according to TVA revealed that attention was predominantly allocated to the movement-relevant locations–without competition between effectors. However, the parallel benefits at the saccade and reach targets had concomitant costs at movement-irrelevant locations, resulting in a fixed overall attention capacity. Moreover, we show that premotor shifts of attention dominate over voluntary deployment of processing resources, yielding severe impairments of voluntary attention allocation. Our findings suggest that attention shifts to multiple effector targets without mutual competition, as long as sufficient processing resources can be withdrawn from movement-irrelevant locations. They also demonstrate that the TVA framework can be used as a sensitive tool to measure action-related shifts of visual attention.

Using TVA-TOJ to probe effects of social salience on early attentional selection

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The way in which we respond to information in our environment is strongly influenced by the perceptual salience it exhibits. Furthermore, the degree to which information is related to ourselves, compared to other individuals, alters response performance in a way that mimics the effects of perceptual salience. A large body of evidence from the last decade now demonstrates how mere association of the self and other social identities with arbitrary sensory information can trigger a cascade of changes in perception, memory, decision-making as well as motor control, leading to behaviourally meaningful and robust processing benefits of self-related information. The present study makes use of the flexibility of the TVA-informed temporal order judgement task to assess how early attentional selection sets up self-prioritization by altering attentional weights or processing rates with which socially loaded information is encoded into short-term memory.

That is, self-prioritization may be mediated either by an increase in attentional weights towards the self-associated stimulus, or by an additional change in processing capacity that speeds up processing of self-related information or slows down processing of other-related information. Preliminary results ($N = 70$) suggest that the tendency to prioritize self-associated information during attentional selection is rather reflected in a shift in attentional weights towards the socially relevant stimulus, while changes in processing capacity following social association seem negligible. This tentatively suggests that the relative social salience of self- over other-related information triggers a selective reallocation of attentional resources between the socially-loaded perceptual objects, without increasing the system's capacity.

Utilizing virtual reality for investigating the neural basis of natural cognition

Klaus Gramann
Berlin Institute of Technology

Recent developments in brain imaging technologies allow for conducting experiments beyond established laboratory-based experimental protocols. Now it is possible to combine brain imaging devices with motion capture and virtual reality (VR) to provide unprecedented insights into behavioural and brain dynamic states during embodied interactions with our surroundings. Head mounted VR systems provide the opportunity to allow active behaviour of participants while controlling the experimental environment. This combination is a significant advantage increasing ecological validity over existing desktop stimulation using 2D displays in seated of lying participants. At the same time, head mounted VR in combination with motion capture allows for systematically manipulating the constituent factors of sensory-motor integration underlying natural cognitive processes. The presentation will provide exemplary experimental approaches from the Berlin Mobile Brain/Body Imaging Labs using synchronized EEG, motion capture and HMD VR revealing striking differences in brain dynamics underlying active behavior as compared to stationary desktop responses. The results will be discussed with a critical perspective on problems arising from the combination of new technologies as well as problems when comparing new results from mobile protocols with established physiological parameters stemming from traditional desktop-based and movement-restricted protocols.

Valence appraisal of actions and its relation to neural error signals and autonomic arousal in healthy individuals and patients with OCD

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Research on error monitoring has begun to address the role of affect and motivation. So far, little is known about the nature of affective processes accompanying error monitoring and how they relate to autonomic arousal and neural correlates of error processing. This talk presents findings from two studies that investigated trial-level associations between

valence appraisal of actions, skin conductance response (SCR), and the error-related negativity (ERN) in both healthy participants and individuals with obsessive-compulsive disorder (OCD). To capture the implicit valence appraisal of actions, we used an affective priming paradigm in which responses in a go/no-go task served as primes for a subsequent categorization of affective words as positive or negative. During this paradigm, SCR was recorded in healthy individuals (Study 1, $N = 30$) and EEG was recorded in patients with OCD and healthy controls (Study 2, $N = 56$). Both studies indicated faster categorization of words when preceded by an action of the same assigned valence (e.g., negative words after errors). This priming effect after errors was diminished in patients with OCD. A trial-level association of the action valence appraisal was found neither with SCR nor with the ERN. Our findings support the notion that valence is automatically assigned to own actions, with errors being evaluated as negative and correct actions as positive. In OCD, valence appraisal of errors seems hampered, presumably resulting from processes interfering with internal action appraisal (e.g., worry). Our results further suggest that the valence appraisal might operate independently of autonomic arousal and neural correlates of error monitoring, indicating that underlying processes may serve different roles in promoting adaptive behavior.

Valence but not attention allocation moderates the effect of stimulus-hand proximity on conflict processing in a Simon task

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Efficient interaction with the environment requires an adaptation of behavior to the environment. We do so by using cues of our environment and relate these cues to our body to predict outcomes of events. The recent embodied cognition literature suggests that task-relevant stimuli presented near the hands receive more attentional capacity and are processed differently than stimuli, which are presented at a spatially more distant position. Further, it has been assumed that conflict processing benefits from near-hand processing. We tested if this attentional bias in near hand space is modulated by the valence of the to be processed stimulus by combining a cuing paradigm (allocation of visual attention) with a conflict processing paradigm (Simon task) in near vs. far hand space (proximal, distal, respectively). The valence of cue processing was manipulated by using affective (angry vs. neutral smileys) gaze cues. Cue congruency, indicating the correct vs. incorrect attention allocation to the target stimulus onset, did not reveal an effect on Simon compatibility × stimulus-hand proximity. In contrast, the interaction of valence × Simon compatibility × stimulus-hand proximity was significant, as well as the interaction of valence, cue congruency, and hand proximity: For negative valence processing the Simon effect was smaller in the proximal than in the distal stimulus-hand condition. This effect was at least numerically reversed in the neutral valence condition. Regarding the effect of valence on cuing and hand-proximity, the cuing effect was bigger for negative valence in the proximal condition. We conclude that valence, as well as allocation of attention and conflict seem to be a decisive factor for the direction and strength of hand proximity effects.

Validating models for paired word recognition using selective influence studies

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Selective influence studies describe experimental manipulations that influences specific cognitive processes. Using these manipulations, one can test whether the respective model parameters that intend to describe exactly these cognitive processes capture the manipulation (convergent validity) while leaving all other parameters unaffected (discriminant validity). To test the validity of the decisional/guessing parameters of two models for the paired-word recognition paradigm, we used this particular approach. In a paired-word recognition task, participants study a list of separate words. However, in the test phase participants' task is to give combined judgements to randomly paired words. Previous research already applied the two models to demonstrate that combined judgements to each pair differ from two separate responses to the same words. Within this talk, we present an attempt to validate certain model parameters. As in typical recognition tasks base-rate manipulations are known to affect decisional/guessing processes, we introduced in Experiment 1 a base-rate manipulation that manipulated the frequency of certain pair types. However, both models captured this manipulation unexpectedly on mnemonic parameters. Therefore, in a second study, we introduced a typical base-rate manipulation affecting the overall frequency of targets and lures during test to investigate whether the first results are an artefact of the design or due to misspecification in the model's architecture.

Validating the UQMC: A model accounting for self-protecting responses in a randomized response technique

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Randomized response techniques (RRTs) such as the unrelated question model (UQM) are applied to encourage honest responding in self-report surveys on sensitive research questions (e.g., on socially undesirable characteristics). However, they cannot completely eliminate self-protecting response strategies. The cheating extension of the UQM (UQMC) was developed to measure the extent of such a strategy, termed cheating. I present an online validation study of the UQMC, addressing intimate partner violence during the first contact restrictions as containment measures for the outbreak of the COVID-19 pandemic in Germany in early 2020. We assessed the empirical adequacy of the UQMC by means of testing model fit and comparing it to that of the classical UQM. To further test the UQMC's assumptions, we experimentally manipulated the question sensitivity to distinctively influence the cheating parameter. We observed a substantial proportion of cheating and the UQMC accounting for self-protecting responses fit the data better than the UQM assuming instruction adherence. However, unexpected results of the sensitivity manipulation highlight the difficulty of investigating sensitive research questions even when using methods that guarantee privacy protection and the importance of testing

model assumptions.

Value-directed forgetting: Are negatively valued words (and their values) inhibited?

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The notion that humans can voluntarily forget some information of their choosing has a long theoretical history in the field of psychology. Since the 60's there has also been a strong empirical history of testing voluntary forgetting in the laboratory. The method of choice has been to use directed forgetting experiments, in which researchers tell subjects which items to remember and which to forget. While the finding that subjects have a harder time later remembering information they were initially told to forget is quite robust, it is questionable whether this "forgetting" is truly voluntary. In the current experiment, we utilize a variation of the value-directed remembering paradigm and assign values to different, to-be-remembered words. The values are either positive (+5 points or +10 points), negative (-5 points or -10 points), or neutral (0 points). In a study phase, subjects first encode a word and then are presented with the cue as to how many points they will receive if they later report the word on a free recall test. However, during the actual recall test, the subjects are told that all words, regardless of prior cue, are worth +1 point, and they should try to maximize their point value. With this method we are interested in a) replicating previous findings showing worse memory for negatively valued words, b) determining if source memory (for the associated point value) is also reduced for negatively valued words (which would be a further measurement of forgetting), and crucially c) determining whether negatively valued words are remembered at lower rates than neutral valued words, which would potentially show that negatively valued words are not only not selectively rehearsed, but possibly actively inhibited.

Vision and audition in phasic alertness

Niklas Dietze & Christian H. Poth
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Warning signals temporarily increase arousal, which has been attributed to performance enhancements. This phasic alerting effect occurs among other sensory modalities with auditory and visual cues. A prominent hypothesis is that auditory warning signals induce greater beneficial effects than visual ones. However, it is unclear if indeed audition dominates over vision or if it is mediated by the stimulus intensity of the warning signals. Here, we parametrically assessed the effects of visual and auditory alerting cues with matched stimulus intensities based on the known reaction times of a simple target detection task. Participants conducted a speeded choice-reaction task with visual, auditory and no cues. Results showed that visual and auditory warning signals generally boosted reaction times. However, we found no evidence for greater phasic alerting effects in auditory warning signals over visual warning signals. Thus, these findings suggest that auditory and visual alerting can be equally effective when the intensities of the stimuli are matched.

Visual adaptation reveals a direction-specific tuning in causal perception and a transfer across speeds

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We vividly perceive causal relations such as launches in which a moving object appears to set a stationary object into motion. Previous studies have established that visual adaptation to launches results in attenuated causal perception. In two experiments, we used visual adaptation to assess the contribution of low-level motion features—motion direction and speed—in perceiving causal relations. Observers saw brief test events in which a peripheral disk moved swiftly towards a stationary one until it overlapped to a variable degree with the second disk (ranging from zero to full overlap in seven steps). The second disk started to move once the first disk stopped and observers then reported whether the first disk set the second disk into motion (a perceived launch) or whether it passed over the second disk in a single motion (a perceived pass). We quantified causal perception using psychometric functions that express the proportion of perceived launches as a function of disk overlap. We then compared psychometric functions obtained before or after adapting to launches. Experiment 1 revealed that adaptation to launches of a particular direction attenuated causal perception in the same direction, but not the opposite direction. Experiment 2 showed that adaptation to launches of a particular speed attenuated causal perception for this speed, and also for test events that featured half or double that speed. Our results cannot be accounted for by adaptation to non-causal features of the adaptor, as non-causal control adaptors—that match the launch in as many physical properties as possible—did not influence causal perception. We will discuss the minimal architecture of a Deep Neural Network for successfully detecting launches while featuring selectivity for motion direction.

Visual perspective taking in older adults: A HD-tDCS study

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Background: Aging can result in impaired socio-cognitive processing, such as visual perspective taking (VPT). A recent transcranial direct current stimulation (tDCS) study demonstrated that the right temporoparietal junction (rTPJ) is causally and selectively involved in VPT in young adults. Here, we investigated if the same relationship exists in advanced age. Methods: 60 healthy older adults were stratified to receive either rTPJ or dorsomedial prefrontal cortex (dmPFC) focalized anodal tDCS in a sham-controlled, double-blind, repeated-measures design while performing a VPT task with two conditions. During visual perspective-tracking (level 1 VPT), participants were asked whether an avatar can see a visual stimulus; during visual perspective-taking (level 2 VPT), participants were asked whether the stimulus was presented on the left or right side of the avatar's position (requiring embodied rotation). Rotation angle of the avatar and body position of the participants in front of the screen varied. 30 young participants completed the VPT task without stimulation. Results: Both older and younger adults show an effect

of rotation angle (slower reaction times with greater angle) and body posture (lower reaction times for incongruent body posture with avatar) during the perspective taking task. Older adults were significantly slower in responding, across tasks and stimulation conditions. rTPJ tDCS did not affect embodied perspective taking in older adults. DmPFC stimulation resulted in further slowing of response latencies in older adults. Discussion: This study failed to replicate modulatory effects of focalized rTPJ-tDCS. Potential mediators of stimulation outcome (e.g. neural network organization, electrical current flow) are currently being explored.

Voice phonetic prognosis of depressive symptoms in psychiatric patients

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In Germany, one in three adults develops a psychological disorder during their lifetime. According to health insurance data, psychological disorders are the cause for the longest periods of work incapacity. The early detection and prediction of particularly depressive disorders is a vital component in the successful treatment and prevention of chronic mental disorders. The voice phonetic analysis of the human voice potentially constitutes an important contribution to this. The analysis results of interview recordings with voice samples of 78 People will be presented. 69 of the respondents were in stationary treatment for depression or schizophrenia (ICD-10-base diagnosis) at the time. The degree of depression was assessed at two appointments (at least 5 weeks apart) using the HAMD-GRID in an interview setting (range $0 - 60$). A paralinguistic feature set (extended Geneva Minimalistic parameter Set; eGeMAPS) with 88 key figures was used to parameterize changes in the voice. For machine learning a Random-Forest-Regressor with Leave-One-Speaker-Out cross validation was trained. The results show both, a good detection accuracy for the current level of depression (MAE: 8,21) and a good prediction accuracy for future levels of depression (MAE: 8,23).

Wakeful resting effects on long-term memory are moderated by individual differences in working memory capacity

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Wakeful resting after encoding new information can support memory retention, while task-related cognition interferes with long-term memory consolidation. Recent evidence suggests that individual differences in working memory capacity (WMC), a factor believed to contribute substantially to individual differences in "online" processing, encoding and retrieval of information, contribute to differences in "offline" memory consolidation during sleep. We tested whether individual differences in WMC also moderate the effect of a brief period of wakeful resting compared to performing a distractor task subsequent to encoding a word list. Ninety-eight participants encoded and immediately recalled a

word list followed by either an 8 min wakeful resting period (eyes closed, relaxed) or by performing an adapted version of the d2 test of attention for 8 min. At the end of the experimental session (after 12–24 min) and again, after 7 days, participants were required to complete a surprise free recall test of both word lists. Our results suggest that individual differences in WMC are a central moderating factor for the effect of post-learning activity on memory retention. While we did not find a universal difference in memory retention between conditions, we found a cross-over interaction between word retention in each condition and participants' WMC over the retention interval of 12-24 min, as well as over 7 days. While retention increased for higher WMC individuals in the resting condition, higher WMC was negatively related to word retention in the distractor condition. Our results shed new light on contradictory findings regarding the effect of post-learning wakeful rest on memory retention and show the importance of considering individual differences in memory experiments.

Web-based assessment of word production and semantic interference in people with aphasia

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Beyond the limitations of the current pandemic, an advantage of running experiments online is that studies can be conducted without having to schedule and transport participants to the laboratory. This may be of specific relevance for long-term follow-up of patients with acquired language or cognitive disorders, including aphasia after stroke. Such follow-up is often constrained by patients' limited mobility. Web-based research can generally allow for scientific access to populations that are otherwise difficult to reach. Recently, we have shown that in neurotypical, young participants, the effects of cumulative semantic interference (CSI; Howard et al., 2006) can be replicated in a browser-based setting (Stark et al., under review). Application in more diverse populations is still pending. Here, we investigate whether the CSI effect can be replicated in people with mild or moderate aphasia (PWA) using a web-based continuous naming task. In this task, participants verbally name 120 object pictures from 24 semantic categories in a seemingly random order. Interference is evident in that naming latency increases with each occurrence of another member of a category. We test the feasibility of the task in PWA and investigate how repeated testing affects the CSI effect. To this end, 30 PWA (currently $n = 6$) and 30 gender-, education- and age-matched controls are tested three times (day 1, day 2, ~day 8) on their PCs at their home or in a separate room in the clinic. For all tests, we use our web-based procedure implemented on the SoSci Survey platform (Stark et al., under review). The first results seem promising in terms of feasibility and replication of the CSI effect. Upon completion of the cohort, we will analyze training effects and group differences in errors and RTs.

What is left after an error?

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Agents create short-cuts in action control by binding features of an acted upon stimulus to features of the response. Re-encountering the stimulus retrieves the bound response, facilitating its execution. If agents commit an error, binding steps in as a corrective measure because the intended, not executed correct response instead of the executed erroneous response enters a binding with the presented stimulus. The current study investigated whether this adaptive goal-based binding and retrieval mechanism depends on error awareness, and it scrutinized the fate of the executed erroneous response in the process of binding and retrieving the intended correct response. The results demonstrate similar binding and retrieval of the intended correct response with and without explicit error feedback, pointing to a critical role of internal error signals instead. At the same time, the data still reveal a continued impact of the unbound erroneous response on action control.

What to rely on: Pedestrian's crossing evaluation when confronted with turning automated (AVs) and manual-driven vehicles (MDVs) at intersections

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Driving dynamics as a means of communication for automated vehicles are currently being investigated primarily for vehicles driving straight ahead. To what extent turning vehicles can also communicate their intention via dynamics remains unanswered. Therefore, the aim of this laboratory study is to investigate the influence of automation status (automated vs. manually driven), driving dynamics (priority-giving vs. priority-taking) and distance (area inflow vs. area crossing vs. area outflow) on the evaluation of the situation by pedestrians (subjective safety, crossing intention, intention recognition).

What webcam-based online eye tracking can tell us about student-teacher interactions in asynchronous remote lectures

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Direct interaction is limited in online teaching, especially in asynchronous lecture formats which have gained popularity during the Covid-19 pandemic. While direct feedback is largely missing, students still actively interact with the material by viewing it on their own notebooks and thereby produce gaze patterns. Their gaze can be measured through the notebook's built-in webcam. In two studies, we used such webcam-based online eye tracking to try and assess the quality of the study material, the importance of a presenter video feed, ability to direct attention through pointing and the degree

of understanding the material. We found that having a presenter video helps to create a more immersive environment and increase satisfaction without a negative impact on learning metrics. Attention can be drawn to areas of interest by pointing (and is also drawn to the presenter), but only eye fixations (no individual eye movements) could be assessed online, so interpretations should be made cautiously. Aggregated visualizations (e.g. heat maps) of where students fixate throughout a lecture can further aid lecturers in optimizing their slides or (audio) directions and foster a connection to the audience. In the future, setting up a system in which students can anonymously submit their gaze data to create aggregate statistics can be beneficial to receive effortless student feedback on specific material without repeatedly asking the same questions. In this context, we will also discuss the current promises, limits and best practices regarding online eye tracking.

When I (do not) see myself: The role of agency and perspective in episodic memory

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Common sense suggests that learning-by-doing is more effective than learning by observing to remember the relevant action episode later. Also, episodes can be recalled from the first-person (1pp) or the third-person perspective (3pp). Despite previous research showing that self-performance and self-perspective lead to a more accurate and vivid memory recall in simple action tasks, it remains an open question whether agency and perspective render the memory of a truly experienced episode susceptible to later modification. The purpose of the present functional magnetic resonance imaging (fMRI) study was to identify the modulational effects of agency and perspective on brain activity during memory retrieval and subsequent memory performance. Participants encoded a set of episodes by either imitating or only observing videos of short toy-based actions. During fMRI a week later, we cued episodic memory retrieval by presenting the original videos, or slightly modified versions thereof, either from 1pp or from 3pp. While we found decreased left lateralized hippocampal activity for previously only observed vs. self-performed actions, agency did not modulate memory performance. In general, subjects often misclassified modified videos as showing episodes experienced during the encoding session, when during fMRI, subjects had been presented (I) modified versions or (II) original versions from 3pp. Together, modified episodic cues can impair memory performance as well as re-experiencing encoded episodes from 3pp. Regarding different agentive states, when subjects miss subtle differences between encoded and cued episodes, the brain remains sensitive for detecting this mismatching information in order to update internal models.

When is semantic auditory distraction beneficial to memory performance ?

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With overheard speech comes great distractibility. Yet, some forms of verbal distraction are capable of improving rather than harming our cognitive performance. While distraction consisting of spoken words semantically related to to-be-remembered targets is usually detrimental to memory, this pattern is reversed when distractors can uniquely specify the category of a particular target. Current theoretical explanations of this phenomenon focus on the role of distractors in elaborating targets' representations in memory. It is not clear, however, whether such elaboration is automatic or requires the engagement of attentional resources. We investigated this problem by varying the engagement of attention during learning under distraction with a manipulation of perceptual difficulty of processing targets, assumed in distraction studies to foster greater task immersion. We presented participants with lists of visual targets along with auditory distractors and manipulated target-distractor semantic relatedness as well as target's processing difficulty – by presenting to-be-remembered words either upright or inverted. In Experiment 1, we manipulated processing difficulty across study lists to vary attentional engagement across broad chunks of the study activity. In Experiment 2, the same manipulation was implemented on an item-by-item basis within a study list. The results of Experiment 1 replicated the phenomenon of benefits of semantically related distraction for memory and this effect emerged independently of the level of processing difficulty. These results suggest that the process of semantic elaboration based on information conveyed by auditory distraction is largely independent of the allocation of attentional resources.

When life is a within-subjects design: Temporal comparison information overwhelms social information in a sample with depressive symptoms

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Both social and temporal comparison information can be used to guide self-assessment of performance. In student and professional samples, false feedback about performance relative to participants' peer group was found to inform self-assessment over feedback about participants' change in performance over time. This overwhelming effect of social comparison information is true regardless of participants' stated goals, or experimenters' instructions (Van Yperen & Leander, 2014). However, mastery-based goals, i.e. prioritizing self-improvement, are considered more adaptive in terms of affect and motivation than goals prioritizing outperforming others. Depressive symptoms are associated with maladaptive patterns of interpreting information about oneself, which in turn are thought to increase the risk of symptom maintenance and recurrence. We investigated how a sample of $N = 159$ participants with depressive symptoms utilized different types of comparison information. In a false feedback paradigm, we compared the effects of com-

bined social and temporal comparison information on performance self-evaluations for a working memory (n-back) task. Both social and temporal information could be favorable or unfavorable. We found that participants' self-assessment was primarily based on temporal comparison information, in the absence of effects of feedback on working memory performance. Despite comparable performance measures, our results differ from previous studies, suggesting that the overwhelming effect of social comparison information may not generalize to this population.

When painting and music meet: The impact of multimodal experience of art on visitors' aesthetic enjoyment and subjective well-being in a museum

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People assume that multimodal experiences of art (for example listening to music while viewing a painting) are more aesthetically pleasing and artworks might even be easier to understand as the two modalities can complement each other. But so far research focused on arbitrary perceptual congruency and evidence on the aesthetic aspect assumption is scarce. The current study investigates whether music can enhance the aesthetic experience and understanding of a painting in a museum study of Gustav Klimt's Beethoven Frieze combined with Ludwig van Beethoven's Ninth Symphony which originally had inspired the Frieze. Furthermore, beyond improving the aesthetic experience, we investigated if the multimodal experience of art can promote subjective well-being measures of stress, anxiety, mood, and fatigue more than visual art on its own. We used mixed design to compare two groups of people who viewed the painting of Klimt's Beethoven Frieze in the Viennese museum of the Secession either on its own ($N = 111$) or in combination with the music piece of Beethoven's Ninth Symphony ($N = 129$) via headphones. We found that a short museum visit ($M = 14.3(\pm 6.6)$ minutes) was able to improve wellbeing in terms of reduced anxiety, stress, and improved mood. We discuss how and which qualities of music can improve museum visits and subjective well-being indicators. Furthermore, we discuss how individual characteristics such as art expertise can influence art experience in the museum.

Where is the pointing target? Exploring free-hand pointing at 3D objects in virtual reality

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Humans learn to perform free-hand pointing gestures from a very young age, for example when directing someone's attention to an object in the room. Unless an object is very small, this requires selection of an appropriate location on the object as target for the pointing gesture, which is then performed by aligning the index finger tip with the line between the dominant eye and target position (eye-finger vector). But how does our sensorimotor system determine a suitable pointing target on a three-dimensional object?

Based on findings from eye movement guidance, we hypothesized that an object's 3D center of gravity (COG) would be a reasonable baseline when no other constraints are given. Participants were shown custom objects (vases) in a virtual environment and asked to point at the object naturally. Crucially, pointing gestures were performed not using typical VR controllers but using the right index finger. Objects were designed to differ systematically in COG and were presented from multiple viewpoints. Participants' 3D pointing positions were computed by averaging eye-finger vectors for each viewpoint, and then finding the closest point of correspondence between vectors from all viewpoints. Our findings show that 3D endpoints were indeed best explained by each object's 3D COG. Moreover, systematically shifting the COG produced a significant corresponding deviation in the pointing target. These findings suggest that humans compute and select an object's 3D center of gravity when performing a pointing gesture, at least when pointing to single objects without task-specific instructions.

Where is the toaster? Interplay of episodic memory and semantic knowledge during remembering of past events

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Misremembering details of recent experiences is ubiquitous in everyday life. Over the last years investigation prior knowledge as a contributing factor to memory biases became more prominent in memory research. Yet the exact underlying mechanisms remain unclear. The scenario construction model postulates that during encoding, only the gist of an episode is stored in the episodic memory trace and during retrieval, any needed information that is missing from that trace is substituted from semantic knowledge. In our study we aimed to investigate semantic substitution in a realistic, yet controlled setting. Participants navigated through a flat in a virtual reality (VR) and interacted with task relevant common household objects. The household items appeared in expected and unexpected locations to create conflicts between episodic memory and semantic expectations. During subsequent memory recall, we asked for the remembered location of an object and thus, we were able to distinguish between correct episodic recall, semantic substitution and guessing. In addition, we controlled the effect of attention, by manipulating task-relevance of objects. Both congruency and task-relevance predicted correct episodic memory retrieval. During recall, semantic substitution was more likely than guessing and occurred more frequently for task irrelevant objects. Our findings support the predictions of the scenario construction model. The new VR-paradigm is a promising tool for investigating semantic substitutions.

Who ignores – and why?

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People often ignore the consequences of their own behavior for others and behave more selfishly as a result. Such behavior can be observed in donation decisions or environmental behavior and results in social welfare losses on a societal level. Traditionally, ignorance in these situations has been assumed to be motivated by selfishness: people ignore the consequences of their choices so that they do not feel bad about behaving selfishly. Evidence suggests that selfishness might not be the only, nor even strongest motivation for ignorance (Ritov & Kandul, 2017; Exley & Kessler, 2021). We aim to investigate other potential motivations, such as decision aversion or cognitive laziness. In Study 1 ($N = 98$), subjects were asked to make a binary decision between a first option which is more beneficial for them, and a second option which is more beneficial for a charity. We manipulated whether subjects had the opportunity to ignore the donation size attached to each option (ignorance condition) or not (baseline). We found that 56.5% of our subjects stayed ignorant when possible, and prosocial choices significantly declined from 69.4% (baseline) to 34.4% (ignorance condition), replicating the finding of Dana et al. (2007). In a study with four waves of data collection taking place in January 2022, we dig deeper into the question of who ignores – and why. Using the setup of Study 1, subjects will make multiple (self vs. donation) decisions, whereby we will vary the receiving parties and the kind of information that can be ignored. Observing multiple ignorance decisions from the same person and combining those with measures of their personality will allow us to shed light on the underlying motivations for ignorance, while also observing how it changes people's social decisions.

Who is the nice guy? The influence of personality on source memory

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A popular assumption in evolutionary psychology claims that reciprocal altruism is supported by a cognitive module that helps individuals to detect and remember defectors. Recent findings indicate, however, that source memory for defectors is not generally enhanced. Furthermore, there are individual differences in non-exploitation and non-retaliation – and, thus, the two aspects of reciprocal altruism – which are covered by Honesty-Humility and Agreeableness in the HEXACO model (Ashton et al., 2004). This suggests that Honesty-Humility and Agreeableness may also be linked to source memory for cooperative and defecting individuals. In two studies, we thus tested the influence of Honesty-Humility and Agreeableness on source memory for cooperative and defecting persons. In contrast to our expectations, Honesty-Humility showed no relation to source memory. However, Agreeableness was indeed linked to source memory for defectors, in the sense that individuals with low levels of Agreeableness had a better source memory for defectors. These findings demonstrate the potential of integrating memory and personality research to better understand the cognitive processes underlying individual differences in behavior.

Why and how should cognitive science care about aesthetics?

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Aesthetic processing has a great impact on our everyday lives. It influences our choices regarding romantic partners, where we wish to live, how we dress, which objects we surround ourselves with, and the activities we pursue in our leisure time. Aesthetic considerations affect health, productivity, and learning; and participation in cultural activities is positively related to wellbeing. The desire to identify the principles underlying aesthetic processing has played a dominant role in the history of human thought. For more than two millennia, theoretical reflections on aesthetic perception have been an important domain of philosophy. By contrast, empirical approaches to aesthetics – as first advocated in mid-nineteenth century psychology – have not found any major, sustained representation at universities and are only now on the verge of becoming accepted as a mainstream field in experimental psychology and the cognitive neurosciences. But what actually is the agenda of empirical aesthetics? What are its main goals? What characterizes aesthetic experiences? Why is it important to study them, and how? This presentation will touch upon these issues. It will discuss how research conducted so far can be categorized as either being subject-oriented or stimulus-oriented. It will argue that for its further development, empirical aesthetics must integrate these approaches into a unified paradigm with a strong focus on temporal unfolding and on interactionist processes within both the perceiver and the stimulus. Finally, the need of conceptual clarity will be addressed, the scope of empirical aesthetics and its integration into a broader academic landscape.

Why bother? Relational evaluative conditioning is moderated by the perceived probability of US occurrence

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In Heycke and Gawronski (2020), pharmaceutical products (CSs) preventing positive or negative health states (USs) produced weaker evaluative learning than pharmaceutical products causing these health states. Such asymmetrical relational evaluative conditioning (EC) effects were found for evaluative ratings as well as for evaluative CS classifications, and an MPT analysis of the latter revealed an unqualified influence of US valence on evaluative behavior as measured by the CS classification task. While the weaker relational EC effects for "preventing" CSs are indeed well explained by a (non-propositional) influence of US valence on CS evaluation, the aforementioned pattern can also be accounted for by weaker propositional learning for "preventing" than for "causing" CSs. In the present study, we tested the idea that propositional learning for "preventing" CSs in Heycke and Gawronski (2020) may have been selectively disadvantaged by the use of rather extreme health states (as USs) that are highly unlikely for the typical participant. In a close replication of Heycke and Gawronski (2020), we found asymmetrical relational EC effects and an unqualified influence of US valence in the MPT analysis when using subjectively improbable health states as USs. By contrast, we found relational EC effects

of comparable strength for "causing" and "preventing" CSs and no influence of US valence in the MPT analysis when subjectively probable health states served as unconditioned stimuli. The theoretical and methodological implications of these findings are discussed.

Why online collaboration can work: The role of expertise in sequential collaboration

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Sequential collaboration is often used in online projects such as Wikipedia and OpenStreetMap, where one contributor creates an entry which is consecutively adjusted and maintained by later contributors encountering it. Recent research found that judgments improve over the course of a sequential chain and can finally even outperform judgments obtained with wisdom of crowds. However, the mechanisms making sequential collaboration successful are still unclear. To investigate the role of expertise, we performed two studies in which we measured expertise using geographical knowledge items or manipulated expertise using a perceptual estimation task. In each study, participants saw preselected judgments of varying accuracy and could decide whether to adjust or maintain the presented judgments. Both studies showed that experts change entries more frequently and make more accurate adjustments to the presented judgments while novices make fewer and less accurate changes while still being able to improve vastly incorrect judgments. Furthermore, a third study extends our results to actual sequential chains of judgments as opposed to preselected judgments. Thereby, we examine when judgments are maintained which is crucial for sequential collaboration to prevent experts' judgments from being worsened by novices.

You can('t) always get what you want: When goal persistence requires flexibility

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Cognitive flexibility and stability are usually thought of as two antagonistic control demands: Flexibility allegedly comes at the cost of increased distractibility and reduced stability whereas stability comes at the cost of increased rigidity and reduced flexibility. Here, we question this antagonism by asking whether goal persistence in some situations can also promote behavioral flexibility. Using a voluntary task switching paradigm with double registration, participants first had to choose a task and then – on a subset of trials – were confronted with a non-chosen task. In two experiments, we found that after increasing goal stability by remaining high reward prospect participants showed a higher voluntary switch rate after such invalid trials than after valid trials where the chosen task could directly be executed. This is taken as evidence that goal persistence can be accompanied by increased flexibility (voluntary task switch) to enable the execution of the unfulfilled goal.

You can't have one without the other: On the dimensional influence in pointing interpretation

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Pointing is frequently used in daily communication to achieve joint attention. Experiments in which participants estimated the target height on a pole when seeing the pointing gesture from a sideward position showed that observers extrapolate the arm direction for the interpretation (e.g., Herbort & Kunde, 2016). As pointing and its interpretation are normally not limited to one dimension only, we examined in our experiment, whether the observer's judgements are derived independently for each dimension. Therefore, we orthogonally manipulated the horizontal and vertical orientation of the pointing arm, as well as the observer viewpoint (standing behind the pointer or beside him) and the distance between the pointer and the wall he was pointing at. Furthermore, we checked how consistent an observer interprets identical gestures and whether all observers judged the target location similarly. We found that observers did not base their horizontal interpretation solely on the horizontal arm orientation. Instead, the vertical arm orientation significantly affected the interpretation, too. This bi-dimensional influence was also found for the vertical dimension. Additionally, observers behaved very consistently – regarding their own judgements as well as compared to the judgements of other observers.

You might not like it more, but still, choose it more: The facilitation of low-calorie food choices by approach-avoidance training and its neural underpinnings

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In the obesogenic environments governing most of developing and developed countries, the importance of impulsive behavior (i.e., well-established stimulus-response contingencies) in food choices is undeniable. Approach-avoidance training (AAT) is a nonreinforced learning method used successfully to affect unhealthy behavior such as alcohol consumption. However, its effectiveness in altering food choices, especially in healthy-weight participants, is debated, and further, its neural underpinnings are under-investigated. In the current study, 34 normal-weight participants went through AAT, where low and high-calorie food cues were consistently associated with approach and avoidance responses, respectively. Further, in the pre and post-training sessions, a subjective rating and a food choice task were administrated inside a 3T MRI scanner. Our behavioral results showed that AAT can facilitate choices of low-calorie food items. Notably, these changes were not related to alteration of food preferences but instead indifference points, indicating that newly formed stimulus-response contingencies were the driver of observed changes in food choices. Further, neuroimaging results revealed that behavioral changes were correlated with the increase in the activity of the posterior cingulate cortex (PCC). Even

though the medial and dorsolateral prefrontal cortices were modulated by ratings, their activity was not changed by AAT. Finally, voxel-based morphometry showed that grey matter density in PCC was correlated with observed changes in neural activity, speaking of a possible predisposition to nonreinforced learning. Together, the current results show that action initiation, relying on a distinguishable neural system, can affect food choices orthogonal to subjective ratings.

Posters

Action control trumps instruction when taking the perspective of avatars

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Past studies on user-avatar interaction have demonstrated that users are able to take the perspective of an avatar and act as if they were in the avatar's place. As a result, the positions of objects are coded from the avatar's point of view and avatar-based compatibility effects can be observed that are based on the avatar's spatial reference frame. In the present study, we confronted participants with two different avatars at the same time that offered different and conflicting visual perspectives. We asked participants to take the perspective of one of them while performing a Simon task. In one half of the experiment, participants' actions controlled the hands of the instructed avatar and in the other half they controlled the non-instructed avatar. We observed a compatibility effect based on the position of the controlled avatar, even when the participants were instructed to take the perspective of the other avatar. This indicates that the stimuli were coded from the perspective of the controlled avatar, regardless of instruction. The bottom-up influence of action control overpowered the top-down influence of the instruction.

Affektive Sprachverarbeitung und chronischer psychischer Stress: eine Online-Studie

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Aktuell ist wenig darüber bekannt ist, wie psychosoziale Faktoren die Sprachwahrnehmung beeinflussen können. Dies ist überraschend, da gesprochene Sprache unser primäres Kommunikationsmittel ist und eine Beeinträchtigung dieses Systems unter Stress vielfältige negative Auswirkungen haben kann. In der aktuellen Studie, welche wir online an 200 deutschen und 200 englischen Muttersprachlern durchgeführt haben, untersuchen wir die Performanz der Emotionserkennung in der Sprache in Abhängigkeit von dem subjektiven Stressempfinden und sozialen Copingstrategien. Dazu schätzen die Versuchspersonen, die Emotion von einem gehörten Pseudosatz ein. Die Sätze wurden sowohl emotional neutral als auch in 4 Emotionen (angenehme Überraschung, Trauer, Angst, Freude) eingesprochen. Als abhängige Variable haben wir die unbiased Hit Rate gemessen. Außerdem haben wir das subjektive Stressempfinden sowie die Copingstrategien der Versuchspersonen abgefragt und die Personen auf der Basis ihres Stresssempfindens in 4 Gruppen aufgeteilt (low, medium, high, very high stressed). Die Daten zeigen, dass Personen, die ein mittleres chronisches Stressempfinden haben, selektiv besser die Emotion Angst in der Sprache wahrnehmen (Interaktion Stressgruppe × Emotion). Außerdem korrelierte das wahrgenommene Stresslevel mit der unbiased Hit rate für die Emotion Angst. Die Performanz in den anderen Emotionskategorien war von dem Stresslevel unbeeinflusst. In der Moderationsanalyse zeigte sich kein Hinweis darauf, dass die soziale Copingstrategie ein signifikanter Moderator dieses Effekts ist (keine Interaktion von Stress und sozialem Coping).

Alpha traveling waves reflect selective processing in working memory retention

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The functional role of traveling waves remains elusive. Much attention has been devoted to its relationship to the progression direction of waves. Though previous studies have suggested that bottom-up information input induces forward waves, whereas backward waves convey top-down regulation, there is still a lack of evidence concerning changes of wave direction in various cognitive processes apart from visual stimulation. Here we re-analyzed a pre-existing EEG dataset recorded from 104 subjects and examined the power changes of waves propagating on posterior-anterior axes during a working memory task. Special interests were focused on alpha ($8-12$ Hz) traveling waves. Our results generally reveal stronger alpha forward power in the midline and backward power in the lateral axes. Backward waves increased while more distractors were included in the memory display, and decreased in the contralateral axis relative to the target. Importantly, all these effects were observed during maintenance of visual stimuli and thus potentially reflect selective processing during working memory retention. Specifically, forward waves for active encoding of targets, while backward waves indicate a general suppression of irrelevant information. Our study provides further neural evidence regarding the cortical spatiotemporal dynamics in cognitive processing.

An alien perspective on moral decision making

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The famous "footbridge problem" has often shown people's reluctance to push a stranger onto train tracks to save five others from an oncoming train. This preference for the deontological choice can further be enhanced by invoking empathy in the decision-makers (Conway and Gawronski, 2013). However, with increasing calls for acting more utilitarian in moral choices (e.g., Singer, 1972; Harris, 2010) and for empathy to play a lesser role in these decisions (Bloom, 2016), there is a need for understanding ways of enhancing the utilitarian choice for the greater good. The present research proposes a new way of enhancing this utilitarian response, by asking people to imagine themselves as being an uninvolved extra-terrestrial alien observing the scenario from above. In 5 preregistered studies (total $N = 3,563$), across different scenarios, the present research shows that taking the perspective of an uninvolved observing alien (vs. a control group) significantly increased responses favouring the utilitarian option (Cohen's d ranged from 0.38 to 1.01). This was true of both hypothetical scenarios such as footbridge dilemmas, as well as the real-life question of whether all U.S. nuclear weapons should be destroyed. Overall, the present research shows a new way of enhancing people's responses favouring the greater good in moral dilemmas. The results were consistent across different studies and different

scenarios including real-life moral questions.

An inexcusable mistake: When are non-prototypical applicants discriminated against?

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The stereotype content model predicts that Turkish women are stereotyped as being warm, but incompetent, which should result in negative competence-related impressions of them. However, findings are mixed, with sometimes more positive competence-related impressions of non-prototypical (i.e., Turkish women) as compared to prototypical (i.e., German women) applicants resulting in the hiring context (Niedlich & Steffens, 2017). We aimed to identify boundary conditions under which negative impressions of Turkish women in Germany result, hypothesizing that non-prototypical individuals who made a mistake are perceived less favorably than prototypical targets who made a mistake. We manipulated targets' group identity (German vs. Turkish/Kurdish) and performance (mistake vs. no mistake) and used a within-subject design with participants ($N = 272$) evaluating hypothetical assessments of four applicants. We did not find interaction effects between targets' group identity and performance: Replicating Niedlich and Steffens (2017), non-prototypical individuals were more likely to be recommended for promotion to team leadership than prototypical individuals (regardless of whether they made a mistake or not). Individuals who made no mistake were more likely to be recommended for promotion to team leadership than individuals who made a mistake. In contrast, non-prototypical individuals who made a mistake were excluded more often than all others for a future team project. This pattern applied equally to the sub-sample of participants who experienced racism ($N = 123$). We found no mediating effect of non-prototypical targets' internalized racism and prototypical targets' modern racism. We discuss these results in the context of the continuum model (Fiske & Neuberg, 1990).

Anticipated validity influences self-generated expectations

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When participants predict the upcoming stimulus and their prediction is correct, they are faster compared to when they see a cue for the upcoming stimulus. This effect is both present, when the most likely stimulus has to be predicted as well as when the least likely stimulus has to be predicted. A dominant explanation is that the increased response speed is caused by activation of the predicted stimulus and not a direct result from the expectation. However, in the previous experiments, all stimuli were presented with equal chance. Thus, in those experiments participants were unable to predict the stimulus, and therefore may not believe in the validity of their predictions. We conducted an experiment in which the predictions itself influenced the upcoming stimulus. Depending on the color of a cue, participants either had to predict the stimulus that would appear with 75%, 50%, or with 25% probability. Predictions were either self-generated or cued

in different trials. Because, there are only two stimuli to classify, a 25% chance of match would suggest that the participant have to prepare for the stimulus they did not predict. In a control condition, we also attempt to conceptually replicate the original findings by Hacker and Hinrichs (1979). In this condition, participants are asked to predict which stimulus they find most likely, least likely or just select any of the two possible stimuli. In this control condition, the upcoming stimulus is then always selected with 50% probability and participants are made aware of this in the instructions.

Are we all equally bad at concurrent multitasking? Individual preferences and performance in a more complex multitasking paradigm

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Multitasking is inevitable in our lives as in many everyday situations, we must manage several tasks simultaneously. Still, the American Psychological Association (2006) recommends avoiding multitasking, especially for complex tasks, because multitasking has been shown to increase performance costs. This recommendation is questionable since (1) multitasking has mostly been studied with simple, not complex tasks, and (2) only some previous research has considered individual differences in the preference for serial or parallel task processing and their impact on performance. It has recently been shown that individual differences exist in the preference for serial or overlapping task processing in a task-switching paradigm. In the present study, we investigate whether the results regarding individual preferences and performance in a task-switching paradigm can be extended to a more complex multi-task paradigm. The participants will complete an online study consisting of two parts. In one experiment, they will perform the task-switching with preview paradigm using two simple classification tasks. In the other experiment, they perform a more complex task using an online version of the SynWin paradigm. We expect there to be a correlation between the performance in the simple and the more complex multiple tasks. We also expect to find that the participants tend to use the same individual processing preference in the simple- and complex- multiple tasks. We will also examine performance consequences of individual processing modes in the more complex task environment, expecting better multitasking performance for those participants with a preference for parallel processing.

"Are you going to look?": Predicting anticipatory saccades towards future action outcomes via a neuroevolutionary machine learning algorithm

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When their actions are going to cause predictable effects in their surroundings, partici-

pants already move their eyes towards the locations of these future effects in anticipation. In this study, we used the neuroevolution of augmenting topologies (NEAT) algorithm to predict whether participants perform an anticipatory saccade (AS) towards the location at which a visual effect of their action is going to appear in the future. Previous research has linked such ASs to proactive effect monitoring (PEM) processes which facilitate the later comparison of expected and actual effect. Considerable inter-individual differences in the frequency and distribution of ASs, however, raise the question whether PEM also underlies the individual distribution of ASs across trials. We used data of two experiments and selected the data of participants with high proportions of ASs (i.e., presumed high PEM; criterion-based model) to train a population of neural networks (NNs) via the NEAT process to predict whether an AS was performed in each trial. We then assessed the performance of these NNs on the remaining data (testing) and on data from another experiment (transfer). Prediction accuracy of our criterion-based model was comparable to NNs trained on a randomly selected, bigger subset of data (basic model). Moreover, prediction accuracy for individual participants correlated with their scores on the criterion. These findings suggest that a systematic PEM process underlies the distribution of AS even though there is substantial inter-individual variation. More generally, we demonstrate the potential of using neuroevolutionary machine learning in theory-driven research.

Assessing anticipatory saccades towards the future consequences of one's actions via online eye tracking

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When an action yields a certain effect, we form bi-directional action-effect associations that allow us to anticipate both the location and timing of our actions' effects. This can be observed through anticipatory eye movements towards future effect location (proactive effect monitoring). Moreover, participants performed anticipatory eye movements earlier when the effect's delay was short rather than long (200/800ms). To assess whether anticipatory eye movements could also be reliably investigated using online eye tracking via participants' individual webcams, we developed an online experiment where a correct response contingently led to a spatially compatible (left response > effect on the left) or incompatible (left response > effect on the right) visual effect presented after a predictable short/long delay. Replicating offline experiments, we found that participants performed their anticipatory eye movements towards the effect earlier for short rather than long effect delays. Simultaneously and in contrast to prior studies, however, participants only anticipatorily looked towards the future effect of their actions (significantly but barely) above chance on compatible but not incompatible trials. Interestingly, participants' responses to post-experiment questions suggested that they intentionally focused more onto the middle of the screen where the targets appeared and tried to intentionally inhibit eye movements to the sides to optimize their performance. Following experiments will have to assess the influence of effect relevance on participants' strategies and eye movement patterns. Concluding, we demonstrate that anticipatory eye movements reflecting a time-sensitive proactive effect monitoring process can reliably be assessed offline as well

as online.

Attentional capture versus suppression during search for targets conjunctively defined by a positive and a negative feature

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During visual search, attentional guidance is influenced by facilitation and suppression of features depending on search goals and bottom-up factors. Here, we investigated how features that positively and negatively defined the target influenced attentional guidance. Participants searched for a target conjunctively defined by one positive (present with the target) and one negative (absent with the target) feature. For example, the target was composed of two bars. One was blue, and the other bar was nonred but had an alternative nontarget color that changed from trial to trial. We examined attentional guidance using singleton cues with the positive, negative, or neutral (i.e., entirely task-irrelevant) color. The cue preceded the target at the same (valid trials) or a different position (invalid trials). For cues with the positive color, reaction times were faster in valid compared to invalid trials, indicating that they captured attention. However, for cues with the negative color, reaction times were slower in valid compared to invalid trials, suggesting proactive suppression of the negative color prior to the target display. Unexpectedly, cues with a neutral color produced similar results as cues with the negative color, indicating that they were also suppressed. Thus, search for a target conjunctively defined by one positive and one negative color seems to elicit feature-based capture of attention by the positive color, while, at the same time, any not-to-be-searched color is suppressed.

Autobiographical memories and odors

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The Proust effect describes the phenomenon that odor associated memories are older, more emotional, more vivid and rarer than memories associated with other modalities (for a comprehensive review see Hackländer et al. 2019). While the reason behind odor-cued memories' higher emotionality is yet to be determined, a promising explanation might be the special way odors are processed. Yeshurun and Sobel (2010) found that odors are generally processed in terms of emotionality. This emotionality might be ascribed to the whole event, if the odor is not the center of attention. In a series of studies we want to assess this explanatory approach by focusing on whether odors are the center of attention in autobiographical memories cued by odors. In an voluntary-retrieval paradigm, we will have participants retrieve autobiographical memories cued by odors, pictures, or words and rate the centrality of the cue to the memory. Participants will then be presented with their memories a week later to assess their memory of the original cue modality. Participants will also rate the memories for other variables, such as age of memory, pleasantness, frequency of rehearsal, and other variables often associated with the Proust phenomenon. We hypothesize that, when a stimulus triggers an autobiograph-

ical memory, the cue will be rated as less central to the memory, and the cue itself will be forgotten more often, if the cue was an odor than if it came from a different modality.

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

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

Bottom-up and top-down effects of emotionally charged task-irrelevant stimuli under various load conditions

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Previous studies have shown that emotional pictures catch and hold attention compared to neutral ones. Further, it has also been demonstrated that this effect is even more pronounced under high compared to low cognitive load. Yet, whether these bottom-up and top-down effects are uniform across all emotional valences has not been thoroughly investigated to date. Therefore, in this study, we tested how different task-irrelevant emotionally charged stimuli (negative, positive, and threatening) would impact the salience- and executive control of attention networks during low and high cognitive load situations. We used neutral and emotional pictures as task-irrelevant distractors in near (parafoveal) and far (peripheral) positions while participants performed on a visual search task. Our results showed that task-irrelevant threatening distractors had the most pronounced effect on behavioral measures. The distracting effect of threatening images initially slowed reaction times compared to other emotional and neutral stimuli. In contrast, the overall search performance on the whole task was better with threatening and, interestingly,

positive distractors compared to negative and neutral ones. Our results suggest that there are differences between the effects of various emotions on the bottom-up and top-down components of visual attention. Threatening stimuli have the strongest attentional capture effect. Both threatening and positive stimuli can facilitate visual performance, however, possibly through different background mechanisms. While threatening stimuli might increase arousal level and, thus, the available cognitive capacity, positive stimuli could broaden the scope of attention.

Can interactive information pictures enhance learning?

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Pictures have different cognitive functions. For instance, informative pictures provide topic-relevant information, whereas decorative pictures motivate readers (Lenzner et al., 2013). Interactive pictures compared to static pictures allow readers to actively manipulate the variables and thus fosters constructive learning (Rey, 2011). However, it is not yet clear whether interactive informative pictures enhance learning compared to interactive decorative vs. static informative vs. static decorative pictures. We therefore plan to conduct a study with picture type (informative vs. decorative) and interaction level (interactive vs. static) as between-subject factors. Participants will be randomly divided into one of the four groups. They receive a pre-test on prior knowledge, a learning material on Comets (Müller, 2011), and post-tests (on motivation and cognitive load). The study will be conducted via a R Shiny Application and will take approximately 30 minutes. The four groups will be compared in terms of accuracy (retention), reading time, testing time and click frequency. An interaction effect is hypothesized for the two between subject factors picture type and interaction level. We plan to start the data collection from December 2021 to February 2022.

Can natural scenes cue attention for multiple locations? Evidence from eye movements in contextual cueing

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Contextual cueing (CC) studies have shown that people take less time to visually search for and discriminate a target when it is in a consistent position within a repeated configuration of shapes than when it appears in novel configurations (e.g., Chun & Jiang, 1998). However, when a target is shown alternating between two or more different locations in a repeated context the search benefit is smaller, occurs later, and might result from an average of benefits for one location and costs for the other(s) (e.g., Chun & Jiang, 1998; Kunar, Michod, & Wolfe, 2005; Zellin et al., 2011). In two experiments, we investigated whether in real-world scenes, subjects show a comparable CC effect for contexts with one or two possible target locations. Experiment 1 replicated a study by Brockmole and Henderson (2006), who showed a pronounced contextual cueing effect in real-world scenes. Subjects searched and discriminated a small “T” or “L” superimposed on photographs

of real-world scenes. Half of the trials showed repeated scenes with one possible target location each, half showed novel scenes. In Experiment 2, two conditions were added. In one of them, targets appeared in repeated scenes alternating between two possible locations per scene. In the other condition, targets appeared in repeated contexts but at new locations. This controls for a typical confound of repeated pairing of target location and context with context repetition in CC paradigms. Using high-resolution eye tracking during search and a recognition test in both experiments we asked, at which point in the trial the CC effect arises, and whether longer search times to the less favored target location in contexts with two possible target stimuli are due to a detour of the eyes to the other possible target location.

Can self-relevance modulate temporal binding?

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The self-prioritization effect suggests that self-relevant information is processed faster than other-related stimuli which results in faster reaction times and higher accuracy rates when reacting to self-associated stimuli compared to other-related stimuli (Sui et al., 2012). This spurs the assumption that self-associated action effects should cause stronger temporal binding than action effects which are not associated with the self. Makwana & Srinivasan (2019) indeed showed that temporal binding was increased for self-associated compared to friend- and other-associated effects. However, they used interval estimations making it impossible to discern whether the perceived shortening of the interval between a keypress and a self-relevant effect is due to a perceptual shift of the action or of the effect or both. Thus, we addressed the question of the source of this perceptual bias in three consecutive studies (total $N = 88$). The experiments comprised of two tasks, a matching task and temporal binding task. At the beginning of the experiment, participants were asked to assign one of two geometric shapes (Exp. 1 & 2) or sounds (Exp. 3) to themselves and the other to another person. In the matching task, participants indicated whether the shape/ sound presented matched the simultaneously presented pronoun. In the temporal binding task, participants' keypresses produced either of the two shapes/ sounds and they reported the position of the clock hand at either the time of the action or the effect. Even though we replicated the self-prioritization effect in all three experiments, we did not find an influence of the effect's self-relevance on temporal binding.

Categorization liberalizes body perception in pathological illness anxiety

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Research on deviations of body perception in pathological illness anxiety is scarce but intrinsic to optimizing treatments. Building on findings on categorization effects in somatic symptom perception, we hypothesized that fundamental perceptual processes are

disturbed in pathological illness anxiety. We asked the participants to breathe through a tube connected to a pulmonary training device. Their breathing effort was enhanced by linear increasing resistances. The weaker resistances were categorized with arbitrary labels 'A1' to 'A4' the higher with 'B1' to 'B4'. The participants were asked to memorize the sensations and resistances in a first and label them in a second experimental block. Signal detection analyses were used to calculate the sensitivity and response bias. Sensitivity was the ability to differentiate between categories. The response bias was the tendency to misclassify the category of each resistance. Complete data sets of $N = 74$ participants were used to compare the average sensitivity between groups and predict the response bias by group, respiratory load and their interaction in a multiple regression. With similar sensitivity ($t(72) = -0.69$, $p = .4952$, $d = -.16$), patients responded more liberally than control participants before the category border ($\beta_{\text{group}\times\text{resistance}} = .05$, $p < .01$; $\eta^2 = .02$). Compared to the controls, patients misclassified resistances of the weaker category to belong to the higher one, especially at the category border. The assignment of arbitrary categories is sufficient to influence body perception. Patients tended to overestimate the respiratory effort at the category boundary. Thus, a liberally biased bodily perception focused on threat might contribute to this disorder.

Chunking changes information processing in complex machining tasks – results from an eye tracking study

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"Chunking" (i.e., storing related information into complex structures) is an effective strategy to increase processing capacity when understanding novel information. In order to not only store, but also use this information in an applied context, the relations and interactions between different elements need to be integrated as well. This so called "conceptual chunking" (Halford et al., 1998) is highly dependent on prior knowledge and can be either induced or constrained by the sensory input. Hence, if new information is organized in order to enhance the understanding of relations (e.g., by using coordinate systems) rather than actively suppressing it (e.g., by using bar graphs; see Pinker, 1990), related tasks should be solved faster and with improved accuracy. This experiment replicates results from an experimental online study using the context of complex machining processes in a controlled laboratory setting. Moreover, underlying cognitive mechanisms were investigated via eye tracking. During an extensive instruction phase, participants received information about relevant variables of a machining process through different graph types (i.e., coordinate systems versus bar graphs). Then, participants had to solve ten complex tasks. Performance measures and gaze behaviour indicate differences in processing and the formation of a mental representation depending on graph type. The present findings are discussed in light of their implications regarding the design of cognition based assistant systems in machining processes.

Cognitive-psychological evaluation of light armour for police vehicles

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In larger German cities, police vehicles are more and more often target of vandalism. In order to protect police officers on patrol, law enforcement agencies equip their vehicle fleet with a light armour, for instance bulletproof windows or doors. In a first baseline study, German police officers from tactical units and personal security participated in a focus group discussion and elaborated use cases (such as damaged police cars at demonstrations or responding to terrorist attacks) for the deployment of light armoured vehicles in non-military use. The experts were also questioned concerning their visual and cognitive stress and strain while driving a police vehicle with bulletproof windows. Most of them reported related symptoms (such as loss of concentration and vertigo) when being exposed to bulletproof windows for a longer time. A second baseline study aims to experimentally assess the visual and cognitive stress and strain under exposure to three different types of bulletproof windows. To determine the level of stress, German police officers will be asked to perform tasks from the Test of Attentional Performance while either ordinary, polycarbonate reinforced or armoured glass is fixed in their field of vision. Group differences in reaction time and accuracy are expected to be marginal. The level of strain will be assessed with the NASA Task Load Index. Group differences are again expected to be negligible while time of exposure might be correlated with strain. Both the findings of the first baseline study and the expected results of the second baseline study will enable law enforcement agencies to choose the best equipment for their vehicle fleet and will provide recommendations concerning the occupational well-being of police officers on patrol.

Coherence influences on attention allocation and visual information search in multi-cue decisions

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The integrated coherence-based decision and search model (iCodes; Jekel et al., 2018) assumes that decision-makers strive for a coherent representation of the current decision situation. It predicts that information search is influenced not only by the validity of information but also by the coherence of the available information as well as the attractiveness of the options. In two pre-registered experiments (total $N = 107$), we tested qualitative predictions of iCodes for attention allocation in a multi-cue decision task. Framed as a hypothetical stock-market game, participants were asked to repeatedly choose the likely more successful stock based on stepwise available (Experiment 1) or fully available information (Experiment 2). The results showed that the previously observed attraction search effect generalizes from active, deliberate information search to automatic attention allocation in visual search: Participants were more likely to fixate new information on the currently attractive option first. In addition, participants showed a tendency to fixate

coherent information relatively more often than incoherent information. There was no evidence, however, for the predicted late coherence effect, as we did not observe an increase of the coherence influence on attention allocation over the course of a trial. These results highlight the relevance of coherence of information and option attractiveness for predicting visual information search and, thereby, provide support for coherence-based models of decision making such as iCodes.

Comparing two types of backup plans: Redundant vs. contingent backup plans

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When pursuing an important goal, people typically develop a plan for how to proceed. However, given the uncertainty whether the plan might succeed, people frequently develop a backup plan as a "safety net." Backup plans are defined as alternative means that people develop but then hold in reserve while pursuing a goal with "Plan A." Research suggests that investing in a backup plan indirectly reduces goal performance, through the effect of increased backup plan use. However, no study to date has examined whether variations in the way backup plans are specified may impact this association. For example, contingent backup plans are specified to be used if a person's performance falls below a certain standard, whereas redundant backup plans are used whenever a person believes the backup plan is more instrumental for goal achievement. The current study sought to explore whether backup plan investment, use, and goal performance varied by backup plan type. We used a lab-based experiment in which participants threw a ball into a bucket. Participants ($N = 301$ adults, 52.8% female) were randomly assigned to one of two groups: (1) a contingent backup plan group (e.g., "If I don't score enough points by throw 5, I will switch to Plan B") or a redundant backup plan group (e.g., "If Plan B seems better than Plan A, I will switch to it"). As Plan A, we assigned a table tennis ball, Plan B was a tennis ball. We operationalized backup plan investment as the number of practice throws, of a possible 10, where participants chose to use the tennis ball. Initial results suggest that while backup plan investment did not substantially vary between groups, switching to a backup plan did predict a decrease in overall performance in the contingent group.

Comparison of response time outlier exclusion methods

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We present a simulation study, which aimed to compare different methods for excluding response time (RT) outliers. Therefore, two ex-Gaussian RT distributions with a given population difference were simulated in each iteration. RTs were replaced by outliers following two different approaches. The first approach generated outliers at the tails of the distribution, the second one inserted outliers overlapping with the genuine RT distribution. We applied ten different outlier exclusion methods and tested, how many

pairs of distributions significantly differed. Outlier exclusion methods were compared in terms of bias. Bias was defined as the deviation of the proportion of significant differences after outlier exclusion from the proportion of significant differences in the uncontaminated samples (before introducing outliers). Our results showed large differences in bias between the exclusion methods. Some methods showed a high rate of Type-I errors and should therefore clearly not be used. Overall, our results showed that applying an exclusion method based on z-scores / standard deviations introduced only small biases, while the absence of outlier exclusion showed the largest absolute bias.

Concurrent visual learning and transfer of learning

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Implicit learning is thought to be a basic learning mechanism, taking place without conscious awareness about the fact that one learns or what one learns. It is assumed to take place in distributed sets of specialized and parallel working modules. If this were the case, multiple regularities processed in different modules should be learned concurrently. However, it is not clear yet what exactly is processed in these modules. Do modules either process purely perceptual or purely motoric information or do they process distinct features regardless of whether they belong to perception- or motor-related processing. In the current experiments, we focused on exactly this question. First, we tested whether two independent regularities of colors and shapes – both processed within the visual modality – can be learned concurrently. Experiment 1 ($n = 40$) replicated an artificial grammar learning experiment providing first evidence that concurrent learning of a color grammar and a shape grammar is possible. Experiment 2 ($n = 62$) demonstrated the generality of these findings by using a serial reaction time task showing concurrent learning of a color sequence and a shape sequence. In Experiment 3, our results suggest that a perceived color sequence transfers to a sequence of eye movements. Here, we wanted to show that learning is neither purely perceptual nor purely motoric, but abstract and even transferrable. Overall, the findings converge to the assumption that implicit learning is based on modules that process perception- and motor-related information of distinct features.

Conflict adaptation in children and adults: An online mouse-tracking study

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The dynamics and development of cognitive control are typically studied by examining how participants process stimuli that contain competing relevant and irrelevant information in so called conflict tasks. Adjustments in performance following an experience of conflict, also termed as conflict adaptation, is of central importance in the study of cognitive control. The Congruency Sequence Effect (CSE), which is defined as the reduction of the congruency effect following a conflict trial, has been observed in both children and

adults when completing trials of the same task. In our environment, however, we are often required to adapt to a variety of different settings and task demands. The extent to which these performance adjustments are observed in the context of switching between different types of conflict remains in question. The present study aims to investigate how children (aged 6 and 10 years) and adults adjust performance based on previously experienced conflict within- and across- different tasks. In an online study, participants performed child-friendly versions of the Simon and Stroop task and response dynamics were assessed via mouse-tracking. Based on previous evidence, we expect to observe a within-task CSE in each age group, decreasing in magnitude with age. Since these two tasks are rather low in context similarity (see Braem et al. 2014, Frontiers in Psychology), no across-task CSE is hypothesized in adults. It is anticipated that the presence or absence of an across-task CSE in children will provide insights into how conflict is represented across development. Identifying the conditions in which performance adjustments are observed may further our understanding of the recruitment of cognitive control across different contexts and its development.

CoopQ: Questionnaire for measuring the subjective evaluation of cooperation in road traffic encounters

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In nowadays traffic, most encounters of road users are highly regulated. Nevertheless, traffic situations arise that are not explicitly regulated and therefore require communication and cooperation. This will also be true if self-driving vehicles enter our traffic system. It is therefore of great importance that self-driving vehicles are able to react to and show cooperative behavior. Exactly how humans cooperate in traffic is not fully understood yet. The systematic study of cooperative behavior requires appropriate tools and measures. We contribute to the development of tools by developing a questionnaire that assesses the subjective evaluation of cooperation in a traffic encounter. In this work, we present a first version of this questionnaire, which is divided into two parts: The first part of the questionnaire is intended to measure whether a given encounter between road users could be considered cooperation, and the second part of the questionnaire is intended to evaluate the encounter. Based on a literature survey, 39 items, which cover different aspects of cooperation, like altruism, interference, costs and benefits, were formulated for the first part of the questionnaire, i.e. for assessing the occurrence of cooperation. For the second part, i.e., for the evaluation of a given encounter, 40 pairs of adjectives were created based on typical motives in road traffic, e.g. safety and efficiency. In an online survey, 123 participants then rated seven videos of drivers encountering a narrow passage with varying degrees of interaction. Based on factor analysis and descriptive statistics, ten items and 22 pairs of adjectives were selected for a final version. The final version will be tested in future studies to assess the questionnaire's reliability.

Countering hate speech: Social norms and attitudes

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Bystander counterspeech has proven to be an effective way to combat hate speech online (e.g. Garland et al., 2020). However, the mechanisms that motivate bystanders to speak up are not yet comprehensively understood. One influential factor could be social norms, i.e. the endorsement of counterspeech by relevant ingroups (Seering et al., 2017). In two studies with a total of 1,178 participants, we explored whether counterspeech by bystanders against online hate speech is predicted more strongly by the perceived endorsement of counterspeech by one's ingroup or if individually-held attitudes and beliefs exert a greater influence. In both studies, we presented students of a German university with an online discussion scenario that included a hate speech comment and subsequent counterspeech. In study one, the hate was directed at homosexuals and in study two, it attacked Czechs. Following, participants could write a comment themselves, "like" one of the comments, and indicate their support for counterspeech on a scale. In study one, we found that the perceived endorsement of counterspeech by one's ingroup predicted support for counterspeech substantially more strongly than individual morality and beliefs such as political orientation, right-wing authoritarianism, and attitudes towards LGBT* rights. Similarly, "likes" and own counterspeech were predicted more strongly by perceived ingroup norms. In study two, we found again that perceived ingroup normativity predicted support for counterspeech more strongly than attitudinal measures such as political orientation and support for Czech people. We discuss implications of our findings for online interventions and the role of identity performance in virtual conversations.

Cues to joint agency

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Joint action partners may experience a sense of shared control over the outcomes of their coordinated actions (i.e., a sense of joint agency). Although previous research has identified several factors that affect agentive experiences in joint action contexts, it is still unclear what specific mechanisms underly the generation of a sense of joint agency. Approaching this question, we investigated how varying coordination demands affect which cues joint action partners utilise to sense control over sensory events in their environment. In an experiment, pairs of participants jointly reproduced the tempo of an isochronous tone sequence by performing finger taps in alternation or sequentially (i.e., under high vs. low coordination demands). Afterwards, they judged whether tones heard during tapping had been jointly controlled by them or by an external source (a computer) instead. Furthermore, participants rated the quality of their agentive experience during each trial on a scale that ranged from shared to individual control. Results showed that participants reported stronger feelings of shared than individual control under both high and low coordination demands. Analysis of participants' tapping performance revealed that, across conditions, participants made use of both egocentric sensorimotor cues as well

as commonly accessible perceptual cues to infer joint agency. Further analysis indicated an additional influence of cognitive expectations and motivational factors on participants' agency judgments. Overall, our results suggest that a sense of joint agency rests on the integration of multiple cues stemming from different hierarchical levels of joint action monitoring and control.

Cultural influences on the use of temporal sense of agency cues

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Sense of agency (SoA) is the sense of having control over one's own actions and their corresponding effects. SoA may be inferred by using different agency cues. In the present study, we investigated whether the use of temporal cues, that is temporal contiguity between action and effect (i.e., action and effect are close together in time) and temporal expectation (i.e., a match between the actual and expected timing of an effect), differs between Western (Austrians) and Eastern (Mongolians) cultures. Participants first performed adaption blocks in which their actions were followed either by immediate (immediate effect group) or by delayed (delayed effect group) effects. In subsequent test blocks the action-effect delay was varied and participants rated how much control they experienced over the effects. In Austrians, we observed higher control ratings for effects following short action-effect delays than for effects following long action-effect delays in the immediate effect group and a reverse data pattern in the delayed effect group. This indicates that temporal expectation and not temporal contiguity is used as predominant agency cue. In Mongolians, control ratings did not significantly differ depending on different action-effect delays in both groups, indicating that Mongolians do not rely on temporal agency cues. Due to linear time concepts in Western cultures, in Austrians the timing of events may be an important indicator to estimate SoA. However, due to more cyclical time concepts in Eastern cultures, which emphasize reoccurrence of events, in Mongolians it may be less important. Thus, the use of temporal agency cues is culture-dependent.

DataWiz: Research data documentation in psychology made easy

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In recent years, it became obvious that Open Science practices, like sharing research data are not a no-brainer. Instead, sharing research data in a way that actually allows other researchers to (re)use that data means additional effort. In particular, the quality-assured and sustainable provision of research data requires at least a minimum of data documentation. For optimal (re)use, typically three levels of data documentation or metadata are needed: (1) The basic resource description for collection management and

resource discovery (Dublin Core); (2) the study-level documentation for research context and methods; and (3) the data-level documentation (codebooks or data dictionaries). In order to facilitate the laborious task of data documentation in psychology, a web-based tool – named DataWiz – was developed with usability as a central aspect (a rich web application in server-side PHP that runs in a browser). The design goal was to provide a convenient tool for the documentation of the most common types of research data in psychology – especially those representing the long tail of science. Thus, the primary goal of the development project funded by the German Research Foundation is to lower the hurdle to do data documentation and to make it an integral part of common research practices in psychology. The main functions of DataWiz are to generate a research data object containing the data and the metadata in a non-proprietary format which can be uploaded to research data repositories. In this respect, DataWiz can help promote quality-assured sharing of psychological research data.

Despite our differences – learning in social contexts with personalized rewards

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Psychological research on human learning has often focused on mechanisms of individual learning, whereas in reality, we learn as much from social information as our own experiences. Yet the validity of social information is limited by individual preferences or circumstances, which may not match one's own. After all, taking restaurant recommendations from someone with different culinary preferences or financial means may result in an unenjoyable or unaffordable experience. How can social information be useful despite individual differences in reward outcomes for the same behavior? Prior research has proposed various mechanisms, integrating social information at different stages of the decision-making process, including direct imitation of actions (decision-biasing) or increasing the value of socially observed actions (value-shaping). However, these strategies have limited efficacy under diverse individual rewards. Thus, we introduce a Gaussian process regression model of social generalization, where social observations are generalized less broadly than individual learning. This allows social and individual information to be integrated, with social observations having less weight when generalizing about novel outcomes. We test these theories using a modified version of the spatially-correlated multi-armed bandit task: we add social correlations, such that rewards are also correlated across individuals. Social information thus points towards high rewards, but cannot be taken verbatim. Participants perform the task in groups of four, with reward information shared across participants. Our experimental results and model simulations advance our understanding of social learning, shedding light on the mechanism underlying the integration of social and personal information.

Difference index approach for detecting dynamic impact on emotional responses of reappraisal and suppression.

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Emotions are rapid and multifaceted processes that include changes in experience, expressivity, and physiological arousal. In most cases, people additionally implement emotion regulation strategies to manage unpleasant emotions. Of the available emotion regulation strategies, reappraisal (i.e., reinterpret the situation) was described as an efficient strategy, increasing the likelihood of successful regulation. In contrast, suppression (i.e., not showing the emotion felt) seems inefficient, leading to higher physiological and cognitive costs and an increased risk of cooccurring psychological disorders. This study aimed to better understand how these different efficiencies unfold over time after the onset of an emotional episode. Using an index focusing on differences, we sought to better understand the efficiency dynamic of reappraisal and suppression strategies. Emotionally charged positive and negative images were presented to 102 participants (78.4% females, $M_{\text{age}} = 20.75$, $SD_{\text{age}} = 2.15$). Their task was to reappraise, suppress, or just watch the images, while their experience, expressivity, and physiological arousal were recorded. A difference index (DI) was created to highlight regulation efficiency over time and between strategies. As expected, reappraisal helped decreasing negative experience, while suppression did not. It however emerged as being more effective than reappraisal in reducing negative expressivity. More importantly, in all studied parameters, the strategies efficiency significantly changed across time. With the help of the DI, we were able to uncover at which moment each strategy became efficient, revealing it as an effective method to study dynamic changes and turning it into a new possible methodological approach to measure emotion regulation.

Different time course of emotional arousal and valence revealed by the attentional blink

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MHB Theodor Fontane

How does emotion influence attention? Based on findings that valence and arousal of target stimuli and distractors have an influence on the probability of occurrence of the attentional blink (AB), we investigated the influence of affective priming on the probability of occurrence of the AB. The AB is a phenomenon of temporal visual attention, which describes that a second target stimulus (T2) is often missed if it follows within 500ms of the first target stimulus (T1). We hypothesized that emotionally T1 would lead to a reduction of the AB, and that congruency of affective valence would lead to a further reduction. To test this prediction, positive, negative, and neutral T2 were presented after positive or negative T1 in an RSVP stream with pseudoword distractors. T1 and T2 were either 3 items apart, with T2 in the AB, or 8 items apart, with T2 outside the typical AB window. Results show that negative words caused a reduction of the AB for emotional T2—independent of valence—already at lag 3, whereas a valence congruency priming

effect was limited to lag 8. Thus, valence priming takes longer to develop and seems to depend on attentional resources, whereas negative arousal can be evaluated quickly and does not seem to depend on attentional resources. This result is compatible with EEG studies suggesting different time courses of emotional arousal and valence. We speculate that higher-level semantic evaluation is necessary for valence congruency priming, whereas unspecific arousal evoked by negative stimuli is sufficient for arousal priming.

Differentiation in attitudes, learning, and communication

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People form attitudes about individuals and groups based on those attributes that differentiate them from previously encountered ones. That is, people consider redundant attributes less for individuals and groups that are encountered later. In two experiments, we tested whether this differentiation principle is based on differential weighting or learning of unique and redundant attributes. In both experiments, participants sequentially encountered three fictional groups with the same number of positive and negative attributes. We consistently found that attitude formation was guided by differentiation: Participants' attitudes became more negative (positive) for later-encountered groups when positive (negative) attributes were redundant and negative (positive) attributes were unique among the groups. When participants were asked to recall how many members of each group showed positive and negative attributes (Experiment 1), the recalled relative frequency of positive attributes mirrored participants' attitudes. When participants were asked to recall which attributes members of each group showed (Experiment 2), the number of correctly recalled unique attributes was equal for all three groups. However, the number of correctly recalled redundant attributes decreased for later-encountered groups. Experiment 3 found that the differentiation extends to communication as participants were more likely to describe groups with their unique attributes when they were encountered later. We conclude that the differentiation principle in attitude formation is based on differential learning of unique and redundant attributes and that it extends to communication processes. We discuss our findings' implications for the formation of intergroup biases and stereotypes.

Directed forgetting of stimulus-response associations

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Humans can intentionally forget previously-learned information (directed forgetting, DF). Whereas many studies have demonstrated DF for lists of items (e.g., words), where memory for to-be-remembered (TBR) items is typically better than for to-be-forgotten (TBF) ones, the role of intentional forgetting in action control is less clear. Here, we investigated whether the instruction to remember or forget a stimulus affected the formation and/or retrieval of corresponding stimulus-response (S-R) associations. To do so, we combined the DF item-method with item-specific priming: By categorizing stimuli (Exp. 1-3: im-

ages, Exp. 4: words) in a prime phase, participants formed S-R associations. Directly after participants' responses, a memory cue indicated whether to remember or forget the stimulus for a later memory test. In the following probe phase, participants responded to the same stimuli, but the required response item-specifically repeated or switched. Typically, probe responses are faster for item-specific response repetitions rather than switches (S-R effect). In four experiments, these S-R effects did not differ between TBR and TBF stimuli. This was the case when S-R associations already existed before the memory instruction was given (Exp. 1), when stimulus, response, and memory cue were paired multiple times (Exp. 2), when learning new S-R associations (Exp. 3), and when using a different categorization task and word stimuli (Exp. 4). Thus, up- or down-regulating the memory strength of a stimulus representation by the intent to remember or forget it does not inevitably affect the corresponding S-R association. This suggests that top-down memory control selectively operates on certain but not all representations associated with a learning episode (event file).

Dispositional and situational predictors of coping with violated achievement expectations

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Expectations help people to predict the future on the basis of past experiences and knowledge. Expectation violations disrupt an individual's predictive ability and cause uncertainty. This uncertainty evokes a common syndrome of arousal which motivates palliative efforts after worse-than-expected events. The ViolEx Model defines accommodation, assimilation, and immunization as coping strategies after expectation violation. Our study addressed situational and dispositional predictors that may be decisive influences on the use of the three coping strategies. We conducted an experiment with $n = 439$ students. In our study, we manipulated valence and degree of expectation violation, and relevance of the expectation in an achievement test. We furthermore assessed dispositional coping tendencies, optimism, and need for cognitive closure as possible dispositional predictors. Participants experienced the expectation violation in an analogy solving test in which we created and then violated positive vs. negative achievement expectations with manipulated task difficulty and achievement feedback. Negative valence of expectation violation predicted stronger efforts to fulfil the expectation (assimilation) and the combination of negative valence and large degree predicted stronger immunization. Furthermore, dispositional coping tendencies and need for cognitive closure predicted coping with the expectation violation. Thus, our study provides initial evidence that situational influences and personality dispositions both predict coping with expectation violations. Participants showed strong efforts to protect the academic self-concept from unexpectedly threatening feedback by devaluation and ignorance of discrepant information.

Divided attention in healthcare: Investigating the influence of a concurrent task on encoding and retrieval of auditory information

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In healthcare, effective communication between providers is crucial for high quality care, especially in clinical handover situations. Particularly in polytrauma care, there is a high vulnerability for communication errors and information loss due to the complexity of injuries and time critical nature of transmitting (verbal) information to multiple people in multitasking situations. To assess the loss of information due to divided attention, the present study investigated the influence of a visual concurrent task on either encoding or retrieval of auditory information from long-term memory in a mixed design. Participants ($N = 48$) were asked to perform a visual-manual decision-making task while either simultaneously encoding an auditory word list (with unrelated words from a psychological context) or engaging in oral free recall of the previously encoded words. Performance of the decision-making and the memory task was also measured in a single-task condition as a baseline. Furthermore, to examine the possible influence of material similarity on performance of the two tasks, the material of the concurrent task was altered as a between-subjects factor (symbolic vs. verbal material). Divided attention significantly reduced memory performance (recall total and recall latency) as well as performance of the concurrent task (reaction times and error rates). Moreover, performance differences due to divided attention at encoding versus retrieval as well as the effect of material specificity are discussed. As complex sentences are more realistic stimulus material for the memory task in the context of healthcare, a follow up study will be conducted.

Do action effects generalize to a more abstract level?

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The Theory of Event Coding (TEC; Hommel et al., Behavioral & Brain Sciences, 2001) posits, that perception and action are integrated into one common representational domain. One assumption of TEC is that events are coded by integrating simple, modality-unspecific feature codes into an event file. Research in context of the TEC often adapts an ideomotor point of view, assuming that actions are addressed by anticipating their consequences. One precondition for this is, that actions and their effects become associated in the first place (in an acquisition phase). The present study addresses a potential limitation of previous research, as the effects of the acquisition phase and the stimuli of the test phase are physically identical in most studies, not allowing for a clear answer whether an (amodal) abstraction of the effects or the modal information of the actual effect are relevant. We modified Exp. 1 of Hommel et al. (Visual Cognition, 2003), and investigated, whether action effects generalize to a superordinate category (e.g., whether "chair" generalizes to "furniture"). Also, we used (instead of a forced-choice test phase) a free-choice test phase and measured the bias towards congruent responses. We found

in the control group, where effects and stimuli were exactly the same, a congruency bias, suggesting that an association between action and effect was learned. However, in the experimental group there was a much smaller congruency effect. This suggests, that no full generalization from the exemplar words to the corresponding superordinate categories has occurred.

Do all meditation techniques produce similar effects, or how do they differ?

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Meditation is an umbrella term subsuming many different techniques. To date, only few studies have investigated possible commonalities and differences between these techniques. Our study compared four basic techniques that were drawn from a new empirical classification system covering the width of meditation practices. Using an experimental single-case research design, we examined the effects of observing thoughts, humming, walking, and concentrative meditation on healthy participants. 43 participants were randomly assigned to four conditions and three baselines, and 41 participants completed the treatment. Participants enrolled in a six-to-eight-week course, starting consecutively according to their baseline. During baseline and treatment phases participants received daily questionnaires measuring a wide range of dependent variables. Qualitative interviews were conducted with 24 participants at the end of the study. A preliminary analysis of the data revealed many commonalities between the four meditation techniques. All four techniques increased participants' well-being, emotion regulation, and body awareness, and did not change mind-wandering. Contrary to the other techniques, walking meditation did not increase decentering and had the least adverse effects on participants. Individuals varied in response to the treatment. Qualitatively, participants reported many similar experiences while learning meditation, but also experiences specific to their technique. With this study we hope to answer an urgent question in meditation research, namely, whether and how diverse meditation techniques differ from each other. Our results suggest they might have a lot in common. This would allow people interested in meditation to choose and practice the technique they like most.

Do not trust your ears: AI-determined similarity increases likability and trustworthiness of human voices

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AI technology allows for mimicking social interactions which already has been used for subtle manipulations of the recipients. In this project, we present first evidence that averaged and adapted features of artificial voices also involve the risk of subtle manipulations. We trained a deep neural net on a speaker recognition task. The AI embedded voice samples in a 256-dimensional space, so that voice similarity could be calculated based on the cosine similarity of their feature vectors. In a series of five experiments, we established

a set of findings addressing research methods as well as the impact of voice similarity on cognitive processes. Regarding research methods, we show that there is a quadratic relationship between AI ratings and human (dis)similarity ratings (conditional $R^2 = 0.27$, Mdn $r_s = 0.37$). This relationship also held true when the (dis)similarity rating involved the own voice of the participants (conditional $R^2 = 0.21$, Mdn corrected $r_s = 0.15$). This shows that the AI is capable of predicting human similarity judgments. Regarding cognitive processing, we observed that average voices are judged to be more trustworthy (conditional $R^2 = 0.21$, Mdn $r_s = 0.04$). Further, we observed that the similarity of a voice to the own voice increased trustworthiness ratings (conditional $R^2 = 0.19$, Mdn $r_s = 0.15$), as well as the likability ratings (conditional $R^2 = 0.19$, Mdn $r_s = 0.15$). As human (dis)similarity ratings revealed rather moderate test-retest reliability ($r_s = 0.57$), all true relationships are probably larger. In sum, our set of experiments shows that caution is necessary when interacting with artificial voices as they might imply rather subtle manipulations which potentially might bias subsequent decisions.

Does active maintenance of visual location in memory affect the processing of words with an implicit association to vertical space?

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There is a bulk of studies supporting the idea that language prompts reenactments of sensorimotor experience. In particular, the reading of words with an implicit association to vertical space such as ‘sun’ (up) or ‘grass’ (down) was shown to influence subsequent responses to symbols presented in the upper vs. lower part of the screen. However, little is known about whether relevant sensorimotor experiences can influence language processing. Here, we investigated whether a memorized spatial location would affect lexical decision times for words such as ‘sun’ or ‘grass’. In Experiment 1, participants memorized the exact position of a dot presented in the upper or lower part of the screen. During the retention interval, they then performed a lexical decision task on words such as ‘sun’ or ‘grass’. Participants were significantly slower in the match condition (e.g., upper dot and ‘up word’ words) than in the mismatch condition (e.g., upper dot and ‘down word’). As a control experiment, we had participants memorize shapes rather than locations (Experiment 2). As expected, the results did not reveal any influence of shape position on lexical decision times. Finally, we ran Experiment 3, which was the same as Experiment 1, but the dots were replaced with the shapes from Experiment 2. Surprisingly, no mismatch advantage emerged. These ambiguous results cannot be interpreted without replicating Experiment 1, which is currently underway. The results will allow us to shed light on whether and to what extent maintenance of location information in visuospatial working memory affects the processing of words with an implicit spatial association. Generally speaking, the results will help us expand our knowledge of how experiential traces affect language understanding.

Does interpersonal distance affect emotional ratings of masked faces?

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Security practice due to the COVID-19 pandemics comprises wearing a face mask to cover mouth and nose as well as keeping an interpersonal distance of minimally 1.5m. Both of these practices impair social interaction in humans. Especially communication should be affected, since reading others emotional facial expressions was shown to be impaired by face masks as well as by increasing interpersonal distance. In the present study we investigate how perceived distance and face masks together affect evaluation of emotional facial expressions. To that means participants were asked to evaluate perceived valence and arousal of neutral, happy and fearful faces in an online Experiment. Faces were presented masked or unmasked. Perceived distance was manipulated by a dynamic size change, either increasing or decreasing picture size over time, signaling approaching or receding faces. Mean picture size was the same in both conditions. Results confirm typical effects of emotion on valence and arousal ratings of faces: Happy faces were rated more positive and with higher arousal than neutral faces, while fearful faces were rated more negative and with substantially higher arousal than neutral faces. Covering mouth and nose with a face mask resulted in less extreme valence ratings compared to unmasked faces, but did not affect arousal ratings. Although, a manipulation check confirmed distance manipulation, perceived distance did not affect valence or arousal ratings. Probably subtle effects of perceived distance did not emerge because reduced controllability of presentation size and viewing distance in the online Experiment. Therefore, the Experiment is replicated in a lab setting, measuring skin conductance as an psychophysiological indicator of emotion perception in addition.

Does making judgments of learning improve performance for educationally relevant material in multiple-choice and short-answer tests?

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Recent research revealed that predicting one's memory performance during learning (judgments of learning, JOLs) often has reactive effects on memory performance. In paired-associates and list learning tasks, making JOLs has been found to elevate cued recall for related word pairs and recognition memory for single words (positive reactivity), but to reduce cued recall for unrelated word pairs (negative reactivity). However, little research has examined whether JOL reactivity generalizes to educationally relevant study materials and tests. It therefore is an open question whether making JOLs would affect memory performance in multiple-choice tests and short-answer tests on general-knowledge information. We compared groups of participants who did vs. did not make JOLs in order to examine the effects of making JOLs on memory performance for easy and medium-difficult general-knowledge information in Experiment 1 ($N = 99$) and on memory per-

formance for medium-difficult and difficult general-knowledge information in Experiment 2 ($N = 95$). Making JOLs did not affect memory performance in Experiment 1. In Experiment 2, there was a tendency for negative reactivity in the short-answer test but no evidence for reactivity in the multiple-choice test. We conclude that further research is needed to identify conditions under which predicting one's memory during learning might have consequences for test performance in educational settings.

Does personal significance make a difference? Early auditory components during a joint action task

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When two participants perform a Go/NoGo task together, one's own and partner's actions have to be precisely turned to one another. In these kinds of task, stimuli are arbitrary associated with the different co-actors, for example through assigning one particular stimulus color to each co-actor. Both participants carry out this Go/NoGo task together (joint condition) or alone (individual condition). Previous research (Baess & Prinz, 2015) showed an N1 modulation for action-associated stimuli depending on the social contexts. The present EEG experiment assigned different auditory stimuli to each participant. Across two separate sessions, the participants received either arbitrary tones (i.e. sinus tones) or personal significant tones (i.e. message tone of one's own mobile phone). In both cases, one tone was mapped with one's own response (Go-trial), whereas two other tones, i.e. partner-associated tone and a neutral tone, did not require a response (NoGo-trials). The research question was two-folded: i) whether similar early top-down influences of social setting could be obtained in the auditory domain; and ii) whether the personal significance of the stimulus material modulates the early auditory responses further. The preliminary results showed that the N1 response due to different action-associated stimuli in the NoGo trials differed when using personally significant tones, but not for the arbitrary sinus tones. Further differences occurred in the P2 time range.

Does schizotypy boost creativity if protective factors come into play? An investigation using multi-scale entropy of EEG signals

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The purported link between creativity and psychopathology has been studied extensively in the past and yet, there is no consensus on the matter. The Shared Vulnerability Model (Carson, 2011) proposes that both, creativity and psychopathology arise due to the same vulnerability factors. Whether those factors facilitate mental illness or increase creativity is determined by protective factors, such as high cognitive abilities. The present study investigated this idea in a normal population, using self-reported schizotypy and aberrant salience as vulnerability factors. 38 healthy, young, educated adults completed tasks on working memory, fluid and crystallized intelligence as well as two behavioral originality tasks. Multi-scale entropy (MSE) was calculated from the EEG recording

during another originality task to obtain a neurophysiological correlate of creativity. To find the proposed interaction effects, multiple regression analyses were performed. Fluid intelligence interacted negatively with negative schizotypy on behavioral creativity as well as MSE. It interacted positively with disorganized schizotypy on behavioral creativity and with aberrant salience on MSE. Finally, disorganized schizotypy lowered MSE when controlling for cognitive abilities. Cognitive abilities correlated positively with behavioral creativity. No association between positive schizotypy and creativity was found. Overall, the present study does not support a direct link between schizotypy and creativity, or the influence of protective factors as moderators of this relationship. Instead, it highlights the need to investigate the schizotypy facets separately and the validity of multi-scale entropy of EEG signals as a neurological indicator of creativity.

Does the immediate context information influence how object correspondence is established?

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To perceive an object in motion our visual system has to establish correspondence between the different instances of that object over space and time. It has been shown that spatio-temporal continuity as well as object-based information, like features, influences correspondence. So far, however, little is known about how exactly the available information is weighted for establishing correspondence. One possibility is that it depends on the immediate context information. To test this idea, we used a Ternus display, an ambiguous apparent motion display. Depending on how correspondence is solved, three elements are either perceived as moving together (group motion) or as one element jumping across the others (element motion). We used biased versions of this display, in which the elements were colored differently, such that they were either compatible with element motion (element bias), group motion (group bias) or both (competitive bias). We manipulated the immediate context via the frequency of the bias conditions in a between-subject design by mixing the competitive bias display with either the group bias (GB-group), the element bias (EB-group) or the competitive bias display (neutral-group). If this context influences the correspondence solution, we expected percepts in the competitive display condition to be more dependent on the more frequently presented bias because this information would be more reliable. Thus, compared to the neutral-group we expected more group motion percepts for the GB-group and more element motion percepts in the EB-group. Results showed a difference between groups, suggesting an influence of intermediate context information, but in the opposite direction as expected, maybe due to habituation processes.

Does the "not face" facilitate sentential negation processing?

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Pragmatic views of language comprehension assume that non-linguistic information is

integrated during sentence processing. Interestingly, it has recently been suggested that producing and comprehending linguistic negation is associated with specific facial signs of anger, disgust, and contempt – the so-called "not face" (Benitez-Quiroz et al., 2016). In two pre-registered experiments, we investigated whether perceiving non-linguistic information in terms of a "not face" can facilitate sentential negation comprehension. Participants read affirmative and negated sentences (e.g., "Ja, ich will ein Glas Wasser haben" vs. "Nein, ich möchte nicht ins Kino gehen") in a self-paced manner (Experiment 1) or judged the sensibility of affirmative and negated sentences (Experiment 2), respectively. Prior to each sentence, we displayed a photographic representation of a "not face" or a positive control face. However, we did not observe any compatibility effect: Neither reading times (Experiment 1) nor sensibility judgment times (Experiment 2) for negated sentences were significantly faster when they were preceded by a "not face". Thus, the current research does not provide evidence for the integration of non-linguistic facial signs during sentential negation comprehension. In our presentation, we will discuss methodological issues as well as potential theoretical implications.

Does visual spatial attention enhance the aesthetic impression of pictures?

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According to models of aesthetic appearance, various factors, including the speed of processing, memory processes and the meaningful interpretation of stimuli, influence their aesthetic impression. In this study, we investigated whether visual spatial attention modulates the aesthetic impression of art drawings (https://robertbalke.de). Following the presentation of an endogenous spatial cue, two drawings were presented simultaneously on the screen, and participants indicated whether the cued one was green or blue. The second drawing served as distractor stimulus. As a control for the orientation of attention, a colour decision was required for a small dot (20% of the trials) that could appear at the validly cued position or at the non-cued position. Following the attention task, previously used drawings (targets and distractors) or unknown drawings were evaluated by means of a questionnaire. The questionnaire measured beauty, the coherence, the arousal potential and also the recognition performance for the drawings on a seven-point scale. Faster response times for validly compared to invalidly cued dots assured the effective orientation of attention. Importantly, spatial attention increased the aesthetic evaluation for targets compared to distractors and previously unseen drawings. In summary, the results suggest that paying attention to a stimulus positively influences its aesthetic impression.

Don't tell me what I want to hear: Investigating the effect of decision-makers' attitudes on vicarious information selection

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University of Cologne

Often, decision-makers base their decision upon a pre-selected set of information. For instance, to reduce information overload, leaders often ask their employees to seek and filter information for them. But how do people decide what information to present to decision-makers? We predicted that decision-makers receive information in line with the attitude they initially display about the topic at hand. Thus, people may neglect to include opposing information, undermining decision-making quality. Across three studies (total $N = 614$) using different decision scenarios, we did not find the hypothesized biased information selection in line with the decision-maker's attitude. However, regardless of decision-maker attitude, participants consistently showed significantly greater intent to provide positive over negative additional information to the decision-maker. This suggests a positivity bias in selecting information for a decision-maker. As this bias could also undermine decision-making quality, it is important to be aware of it in the decision-making process in order to counteract potential negative consequences.

Dual-action benefits in multiple action control: Temporal dynamics of inhibitory control failures

Jens Kürten, Tim Raettig, Julian Gutzeit, & Lynn Huestegge
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Performing two actions at the same time is sometimes easier than performing only one. Such dual-action benefits occur when the demand to execute a single action is accompanied by a costly demand to inhibit another action. In this context, failures of inhibition are characterized by false-positive executions of the unwarranted action. Previous work demonstrated that the frequency of inhibition failures depends on the degree of prepotency of the action to be inhibited. The current study addresses temporal dynamics of inhibitory control difficulty by focusing on time pressure and preparation time. Participants performed manual button presses, highly prepotent saccadic eye movements, or both actions together toward a single peripheral visual target. In Experiment 1, we manipulated time pressure by imposing a short (350ms) and a long (700ms) response deadline. In Experiment 2, we manipulated preparation for inhibition by means of different preparatory intervals (100ms, 400ms, 700ms, 1500ms). We observed more inhibition failures and thus larger dual-action benefits with a short (vs. long) response deadline and, in particular, with shorter (vs. longer) preparatory intervals. Our results thus reveal that, apart from action prepotency itself, the relative difficulties of appropriate implementation of and preparation for inhibitory control are important determinants of dual-action benefits in multiple action control.

Early detection of dangerous areas in road traffic using smart data (EDDA+) and the police insight into dangerous traffic situations

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In the last decade, the number of road traffic fatalities in Germany tend to stagnate. To get closer to vision zero, new approaches such as the early detection or the prediction of hazardous road traffic situations will provide a more effective guidance towards safer road traffic measures than the retrospective analyses of road traffic crash data used so far. The project Early Detection of Dangerous Areas in road traffic using smart data (EDDA+) collects, in accordance with Hydén's Safety Pyramid, not only conventional crash data but also movement data and user reports, meaning that near misses and minor crashes are also considered. Based on these three data sources, a Germany-wide hazard map is created. To validate the EDDA+ hazard assessments, focus group discussions were conducted with over 200 police officers. The participants brainstormed about dangerous situations for bicyclists, pedestrians, or motorists and rated the perceived dangerousness on a five-point scale. A selection of participants presented their output to give an overview of the situations in place. Finally, the participants discussed their dangerousness ratings within focus groups. Afterwards, a content analysis was conducted. For each road user group, a hazard category catalogue was derived, with superordinate categories such as road condition, road user characteristics and environmental influences. By comparing the hazard assessments determined by EDDA+ with the results of the focus group discussions, the EDDA+ methodology can thus be validated or, if necessary, further improved. In this way, police forces, municipalities or citizens can be provided with a valuable tool to mitigate danger spots at an early stage or to adapt their behaviour in road traffic accordingly.

Easy to remember and difficult to forget? An empirical investigation of intentional forgetting of social information

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Forgetting is an adaptive social feature. For successful navigation in the social world, it is crucial to remember relevant and to forget irrelevant information. Whereas the directed forgetting literature speaks for human's fundamental ability to intentionally forget irrelevant information, the reported research explores potential boundaries of successful forgetting in social contexts. Building upon research that points towards a memory advantage for social exchange relevant information, we addressed the question of whether social relevance impairs intentional forgetting of task-irrelevant information.In two preregistered online experiments, we used the item-method directed forgetting paradigm to investigate our prediction that humans are less able to intentionally forget social information compared to non-social information. First, we tested our prediction in an impression formation context. Participants learned a set of behavioral descriptions about a fictional

person that varied in their social-exchange relevance. In a fully crossed within-subjects design, we instructed participants to remember only half of the behavioral descriptions of each information category and to forget the other half. In a follow-up experiment, we tested our hypothesis in a less social learning context in which participants learned both social and non-social information about an apartment building. In both experiments, recognition memory for both the to be remembered and to be forgotten information was assessed in an old-new recognition test. Although we found a directed forgetting effect in both experiments, we found no evidence for reduced forgetting of social compared to non-social information. We discuss possible explanations for our findings and outline potential future directions.

Effects of a brief period of social media usage after encoding new information on verbal long-term memory

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Evidence exists that social media usage is an effective means to influence learning, memory, and motivation. However, little is known about its effects on memory when used directly after learning. In the present study, we explored the question to what extent social media usage immediately following new encoding affects verbal long-term memory. In a counterbalanced within-subject design with healthy younger adults, we show that compared to a brief period of post-encoding wakeful resting, social media usage had a detrimental effect on 1-day memory retention. Furthermore, the memory detrimental effects of social media usage were similar in its extent like working on a mentally demanding working memory task. Theoretical and practical implications of our findings are discussed.

Effects of a short-term mindfulness induction on cognitive control during the shooter task

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Cognitive control has been shown to be a relevant mechanism in processes following automatically activated stereotypes (e.g Amodio et al., 2004; Payne, 2005). Therefore, training such abilities should result in improved suppression of pre-activated stereotype behavior. Mindfulness meditation has been shown to improve cognitive control though exact mechanisms are debated (e.g. Colzato et al., 2015 & 2016; Ostafin and Kassman, 2012). The present study compared effects of repeated mindfulness breathing meditation (3×20 minutes across 5 days) with progressive muscle relaxation (PMR) of the same length (active control) and podcast listening (passive control) on stereotype expression. At pre- and post-measurement participants ($N = 96$) finished the Shooter Task during which they were presented with Black or White target persons and had to decide whether the person was holding a gun or a nonharmful object. Results of a GLMM showed reaction time speed up for mindfulness and PMR compared to podcast listening for armed

black targets. Accuracy improved for podcast compared to PMR for white unarmed targets and compared to mindfulness and PMR for black unarmed targets. Bayesian Drift Diffusion Models (Pleskac et al., 2018) indicated a greater improvement in evidence accumulation for podcast compared to mindfulness for all unarmed targets as well as for podcast compared to PMR for black unarmed targets. While no consistent shooter bias was found, results suggest that an induction of mindfulness and relaxation did not benefit unbiased decisions. Rather, they sped up decisions in a stereotype-congruent condition and affected evidence accumulation, resulting in less accurate decisions. Implications regarding cognitive demands in the Shooter Task and models of mindfulness are discussed.

Effects of caffeine on the distractor-induced deafness

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In previous studies on the distractor-induced blindness/deafness paradigm, an inhibitory process of selective attention was found. This effect always occurred when distractors had the same characteristics as the following target, leading to a reduced detection rate. Caffeine is known as a psychostimulant capable of enhancing attentional performance as well as producing inhibitory processes via various pathways in the basal ganglia. In the present study, the effect of caffeine on detection in the distractor-induced deafness was investigated. Each subject was tested for a caffeine and placebo condition. As expected, results show an effect of the number of distractors on target detection. Preliminary results suggest that caffeine leads to strengthened attention toward targets in trials without distractors as well as a stronger inhibitory effect in trials with distractors, resulting in a lowered detection rate.

Effects of sleep loss and illumination on effort-related cardiovascular response

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The present study investigated the impact of light intensity and sleep restriction on mental effort. We predicted a main effect of light intensity – stronger effort under dim light – and a main effect of sleep duration – stronger effort after sleep loss. In two sessions (one for each sleep duration condition (5 vs. 8 hours), within-subject), we tested 39 participants, who, after an 8min baseline, spent 15min in dim or bright light (1 lx vs. 100 lx at eye level, between-subject) and then performed a 5min auditory 2-back task. During all sessions, we assessed cardiovascular correlates of mental effort. For cardiac pre-ejection period (PEP), the main effect for sleep duration yielded significance during the light exposure period ($p = .033$), but not during the task period. In line with our expectations, PEP was higher in the non-sleep restricted condition, reflecting a lower mobilization of effort, compared to the sleep-restricted condition. During task performance, heart rate was significantly higher in the sleep-restricted than non-sleep-restricted condition ($p = .047$), but was significantly reduced by bright light in the sleep-restricted condition only, as

indexed by a significant interaction term (light intensity × sleep duration: $p = .007$). This indicates, that light intensity might not affect cardiovascular scores in well-rested individuals. We did not observe significant effects on blood pressure. Although our results are not univocal, they suggest that sleep loss might lead to higher effort, and that light might affect effort-related cardiovascular response in sleep-restricted conditions. Sleep restriction is rather common in our society. Thus, bright light could be a potential countermeasure to alleviate sleep-loss related changes in mental effort.

Effects of transcranial direct current stimulation on distractor-induced deafness

Ana Böke, Henry Ipczynski, & Lars Michael
Medical School Berlin

In previous studies on the distractor-induced blindness/deafness paradigm, an inhibitory process of selective attention was found. This effect always occurred when distractors had the same characteristics as the following target, leading to a reduced detection rate. Frontal transcranial direct current stimulation (tDCS) is known as being capable of enhancing attentional performance as well as producing inhibitory processes in various experimental settings. In the present study, the effect of tDCS in the distractor-induced deafness was investigated. Each participant was tested for anodal, cathodal and sham stimulation. Expected results should show an effect of the number of distractors on target detection in all experimental conditions. Furthermore, the two stimulation conditions could lead to increased attention to targets in trials without distractors and/or to a stronger inhibitory effect in trials with distractors compared to sham stimulation.

Emergence of anticipatory action in an unfamiliar isometric force production task

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When people perform multistep motor actions, early actions are typically executed in anticipation of the requirements of later actions. The end-state comfort effect is an example for this behavior. Albeit anticipatory actions are ubiquitous in everyday life, their acquisition is barely understood. Here, we thus examined how prior experience with a task without the possibility for anticipatory action and different instructions affect the acquisition of anticipatory actions in a novel, unfamiliar task. Participants controlled a cursor by producing isometric forces with the hand. The force produced at the end of a first movement segment determined the ease of a second segment. We varied prior experience and instructions in a between-participant design. Some participants could pretrain the task without the possibility of executing anticipatory actions, whereas other did not have this opportunity. Additionally, participants were either naive, informed about the interdependency of movement segments, or instructed to use anticipatory actions. Participants informed about the interdependency of segments showed more anticipatory actions than naïve participants, irrespective of prior exposure to the task. Prior exposure

only affected anticipatory actions when participants were instructed to use them. This suggests that the acquisition of anticipatory actions requires the construction of a task representation that allows to plan the first action segment with respect to its successor. How specifically the first segment is tailored to the second one does not depend on prior experience with the second segment, but depends on experience from performing the interdependent two-step action sequence.

Endogenous and exogenous acoustic cues in visual search task

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Acoustic signals (AS) can be used as cues in visual search tasks. The spatial congruency of stimuli can cause faster detection. In addition, cues can also refer to the location of target stimuli in endogenous ways. The aim of our study was to measure whether AS affect the distribution of attention in a visual task just via their spatial attributes, or if the subjects can understand the meaning of the AS and therefore use just the stimuli with high predictive value as a cue. We used a conjunctive visual search task. During the task high or low AS were presented on the left or right side. Our task contained a practice phase in which the participants could learn the role of AS in the task. In the practice phase, subjects had to select the target stimulus from two visually identical stimuli using the sound. If participants moved the cursor to target stimuli, they heard an ascending tone; in the opposite case, a descending tone was presented. So participants could learn that the high tone indicated the location of target visual stimulus. In the test phase, both the high and low tones were presented in target's location in half of the cases. According to our predictions, in case of spatially congruent stimuli, faster detection can be measured and the congruent high pitches affect reaction time the most. Although the reaction times were lower in conditions with high pitches and the congruent presentations helped solve the task quickly, these effects were independent. Based on our results, the participants were able to distinguish between the role of the pitch in task, but during the visual search task only the exogenous, spatial cues affected the spatial distribution of attention.

Event-related oscillations in human social interaction and action observation

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Amplitude reduction of the mu rhythm (~8–12 Hz, recorded from central electrodes) has been suggested as a potential EEG marker for human mirror neuron system (MNS) activation. In the present study, 24 healthy neurotypical participants underwent EEG recording during two resting trials. During experimental conditions, participants observed two-minute videos showing a) Non-biological movements (moving balls), b) Not goal-directed biological actions (simple hand movements), c) Goal-directed biological actions

toward an object (complex hand movements) and d) social interactions. Offline, the mu power (8–12 Hz) was assessed in a 100s segment of artifact-free data per condition. Mu suppression index (MSI) was calculated relative to two different baselines: 1. Eyes open resting condition, 2. Non-biological movements. Results showed that relative to the Eyes open resting baseline, there was significant mu suppression during the observation of all experimental conditions with no significant differences between these scenarios. However, with non-biological movements as the baseline, there was no mu suppression. For simple and complex actions, even mu enhancement was observed. We speculate that this counterintuitive mu enhancement could be mediated by top-down inhibition and the interaction of the MNS with other cognitive systems, such as the default mode network. Also, there might be a functional distinction between the higher (~10–13 Hz) and lower ranges (~8–10 Hz) of the mu rhythms, with the former synchronization but suppression of the latter during the observation of goal-directed movements. Finally, more research is required on the mu rhythm paradigms, but this frequency band still seems a promising marker for investigating the human MNS.

Evidence for initially independent monitoring of responses and response effects

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To act successfully, agents must monitor whether their behaviour reached predicted effects. As deviations from predicted effects can result from own behaviour (response-errors) or from circumstantial unreliability (effect-errors), both the own efferent activities and the accomplished environmental outcomes must be monitored. In three experiments, we examined response monitoring and effect monitoring using a dual-task setup. Task 1 consisted of a three-choice flanker task and effects were displayed after the response. Crucially, in some of the trials, an incorrect effect was displayed after a correct response, whereas in other trials, a correct effect was displayed after an incorrect response. This disentangled response-errors and effect-errors. Task 2 was a simple discrimination task and served to measure the monitoring process. Task 2 responses slowed down after both response-errors and effect-errors in Task 1. These influences were additive, suggesting two independent monitoring processes: one for responses, capturing errors in efferent activities, and one for response effects, checking for environment-related irregularities.

Evidence for rhythmic attentional sampling in the right, but not in the left visual hemifield

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Recent evidence suggests that the level of visual attention fluctuates rhythmically when we sample the environment. According to the common sampler hypothesis, there is a system-wide and potentially constant rhythm in the attentional system that determines sampling performance. Here, we tested the hypothesis that attention is rhythmic in a

human psychophysics study: A display-wide flash served as a reset of attentional oscillations at the onset of every trial, and participants had to discriminate the orientation of a Landolt ring (the target) that was presented at varying and unpredictable intervals after the flash, either in the left or in the right visual hemifield. We performed Fourier transformations of the timecourses of reaction time and accuracy relative to the resetting event. We observed statistically significant (as assessed by permutation tests) spectral peaks indicating theta rhythmic attentional sampling. However, this effect was largely restricted to trials with targets in the right visual hemifield. For targets in the left visual hemifield, no compelling evidence of rhythmic sampling was found. Our results are in line with the hypothesis that brain rhythms influence perception and attention. However, because of the lateralisation of the effect, our data are at odds with the hypothesis that a common, system-wide rhythm determines attentional sampling. Instead, our findings are more consistent with the idea that multiple brain rhythms influence attentional sampling, depending on stimulus location and potentially task context.

Feature binding: How multiple features of an object are integrated in working memory (WM)

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The way in which individual features are bound into coherent objects in working memory remains an unsolved question. Currently there are two views in the field: 1) that features are bound via their shared location and 2) that all features are bound together directly. The current study evaluates the two claims and test bindings between multiple features of an object by investigating the conditional probabilities of retrieving one feature, given successful or unsuccessful retrieval of the other (i.e., stochastic dependence). Across two experiments, we used a cued-recall task in which participants memorized multiple objects which were random combinations of three features. Participants were then given one feature as a cue and prompted to report the other two features, one after the other. In Experiment 1, bindings between words, colors, and locations were tested. We obtained very strong evidence for stochastic dependence in retrieving every two features in all cue conditions. In Experiment 2, we assessed the bindings between colors, locations, and orientations. The results showed strong evidence for stochastic dependence only in the color-cue and orientation-cue conditions but weak evidence for this retrieval dependency in the location-cue condition. Taken together, the findings suggest that the strength of bindings between each pair of features varies, and that words and locations are relatively strong retrieval cues whereas colors and orientations are weaker ones. Therefore, when having location as one strong cue, we observed strong bindings between color-location and orientation-location and only weak orientation-color bindings which can cause a data pattern that looks approximately like no direct bindings between color and orientation.

Flexible use of post-saccadic visual information in saccadic adaptation

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Saccades are important for the visual perception of our environment and for the interaction with the objects within it. They precede our actions and are therefore modulated by current action goals. The accuracy of saccadic eye movements required to align the fovea with objects of interest is ensured by saccade adaptation, a recalibration process that is thought to be based on an implicit comparison between the expected and actual position of the target on the retina after the saccade. However, there is increasing evidence that task demands modulate eye movements and that task errors can evoke changes in saccade behavior. In our current study, we investigated whether human participants are able to flexibly use the different sources of information included in the post-saccadic visual image to adapt their saccade amplitude to a task. We instructed our participants to saccade towards a target object within an object array that was either defined by its color or by its position within the array. During the saccade, object positions and colour of the objects were manipulated such that participants were confronted either with congruent post-saccadic information, unambiguously defining the target, or with incongruent post-saccadic information, evoking a conflict between two possible target objects. We found that participants succeeded in decreasing saccade gain or maintaining it, depending on what was necessary to directly look at the defined target object, irrespective of whether the post-saccadic image provided congruent or incongruent information. Participants thus use post-saccadic information sources flexibly, depending on their intentions and pending actions.

Follow my lead! Influence of follower's reliability on leader's goal persistence in a joint goal-setting paradigm

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In a constantly changing environment, goal-directed behavior requires a dynamic balance between goal persistence and goal disengagement. While a growing body of research is dedicated to factors that modulate this balance, little is known about setups that include more than one (co-) actor. The present study investigated how a reliable vs. unreliable co-actor affected participants' goal persistence in a novel joint goal-setting paradigm. Specifically, a participant and a confederate had to move a target in two steps from the bottom center to the top left or right corner of the computer-screen. First, participants indicated their goal choice by moving the target halfway towards either corner. Then, the confederate moved the target to its final position. In the first block (baseline), the confederate always followed the participant's choice. In the second block (test), the confederate followed the participant's choice in 50% (unreliable follower) vs. 80% (reliable follower) of the trials. As DV we used the proportion of participant's goal repetitions in dependence of whether the confederate had followed the participant's choice or not. Results show

increased goal persistence (goal repetitions) after the confederate did not follow the participant's choice. Crucially, this effect was stronger when the confederate was a reliable (80%) rather than an unreliable (50%) follower. We conclude that interdependent goals are only maintained when the co-actor is perceived as reliable.

Forward effect of testing in visuospatial learning

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Retrieval practice can enhance learning of newly studied information. In two experiments, we investigated this forward testing effect in learning of spatial information, that is, arrays filled with objects; participants were instructed to memorize the objects' locations in four learning blocks. We tested the hypothesis that retrieval practice reduces proactive interference (PI) and thereby enhances the learning and retention of objects' locations in the final array. To test this hypothesis, we employed a two-factorial mixed design, with practice type (retrieval vs. restudy) being a within-subject factor and PI (matrices with same vs. different objects across learning blocks) being a between-subjects factor. In each of two sessions, participants studied arrays (Exp. 1: 3×3 objects; Exp. 2: 4×4 objects) either filled with the same objects but in different locational arrangements (i.e., high PI) or with different pictures in the four learning blocks (i.e., low PI). In Learning Blocks 1-3, participants received either an interim test after each array (retrieval practice) or were asked to restudy the array (restudy practice). In Learning Block 4, all participants were tested on the final array. Consistent in both experiments, retrieval practice led to a significantly better location performance in Learning Block 4, compared to restudy, and the forward effect of testing was marginally higher in the context of high, compared to low PI. Furthermore, retrieval practice reduced the number of confusion errors in Learning Block 4 in the high-PI group, compared to restudy. The results indicate that retrieval practice enhances subsequent learning of locational information, at least partially by reducing PI from previously learned arrays.

Good tipping despite wearing a mask? Effects of different masks on tipping in restaurants

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Previous research studies on service-guest interactions have found that a friendly smile from a service worker can increase their tip. But what happens if the guest cannot properly perceive the workers' smile because he or she is wearing a mask? A recent study of 632 participants addressed the question of whether service workers wearing masks receive fewer tips and whether different masks (conventional blue surgical mask, black surgical mask, mask with a smiley face printed on it or no mask) affect the amount of the tip. The results of the study were surprising: the mask alone neither positively nor negatively influenced the tip. Gender also plays no relevant role in tipping. Service workers were found to be perceived as friendlier when wearing a blue surgical mask.

Increased perceived friendliness in turn can lead to higher tipping. When wearing the black surgical mask and the smiley mask, on the other hand, the facial expressions of the service staff are perceived as more closed. Another interesting finding: female service staff are perceived as friendlier than male service staff. The fact that the mask alone does not improve or worsen the tip of the service worker could be related to the fact that society has become accustomed to wearing a mask and that it is an asset rather than a constraint in a service-guest interaction. The particularly friendly effect of the blue surgical mask could be related to the fact that it symbolizes a trusting standard of hygiene, as people have become accustomed to it as a result of the pandemic. The guest wants to feel well taken care of – in normal times, this is achieved by a friendly smile from the service staff. In an advanced pandemic, however, a blue surgical mask can achieve the same thing.

Hemispheric asymmetry of auditory oddball detection: An MEG study

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Mismatch negativity (MMN) and the corresponding component, mismatch negativity magnetic (MMNm) in Magnetoencephalography (MEG) could be elicited in a passive Oddball paradigm, in which the brain automatically reacts to the deviant stimuli without demanding attention. Previous studies with various paradigms show that there is a hemispheric asymmetry in the distribution and characteristics of the MMN signal. However, in current literature, there is rare research focusing on MMN itself as a deviant-detecting function to study its hemispheric asymmetry, and the relationship between the dominant hemisphere in audition and the hemispheric laterality in MMN is neglected. So, this study applied monotonic auditory Oddball paradigm, in which subjects were asked to watch a silent movie and not to respond to the sound. We recorded the evoked MMNm with MEG. The results show that, in temporal lobe area, the MMNm elicited by left-ear sound have a stronger amplitude, including both peak and local averaged amplitude on the right hemisphere, while there is no between hemispheric difference by right-ear sound. We postulate that the hemispheric laterality of MMNm is independent of the auditory dominant hemisphere, contributing to further understanding of the neural mechanisms of the oddball detection in attention.

Hierarchical organization of objects in scenes is reflected in mental representations of objects pictures and words

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The arrangement of objects in the environment follows certain rules which we have termed "scene grammar" that we exploit to perceive and interact with objects in an efficient way. Recently, it has been proposed that scene grammar is hierarchically organized: scenes are divided into meaningful spatial clusters of objects ("phrases", e.g. the sink phrase); within every phrase, one object ("anchor", e.g. the sink) holds strong predictions about

the identity and position of other objects ("local objects", e.g. a toothbrush). To investigate if this hierarchy is reflected in the mental representations of objects, we collected pairwise similarity judgments for triplets of everyday object pictures, as well as for their corresponding German written words, using an odd-one-out task. Then, we estimated behavioral effects of different predictors reflecting three levels of the hierarchy: scene, phrase, and object type ("anchor" or "local"). Results show that similarity judgments are stronger for object pairs that appear in the same as opposed to a different scene. In addition, object pairs that belong to the same spatial cluster ("phrase") are judged to be more similar than objects from different clusters within the same scene. Finally, object pairs that have the same status in the scenes (i.e., they are both anchors or both local objects) are perceived as more similar than pairs of different status. When comparing these effects between stimulus modalities (pictures vs. words), we found even stronger effect of scene level of the hierarchy for pictures compared to words, and vice versa for the phrase level effect. Overall, we found a similar and significant impact of scene hierarchy on the organization of abstract mental representation of objects, independent of stimulus modality.

Highly automated yet highly controlled: A case study of HAVs' on-board operators' workplaces across three real-world laboratories

Andreas Schrank, Carmen Kettwich, Silvio Heß, & Michael Oehl
German Aerospace Center

Highly automated vehicles (HAVs) bear the potential to make mobility safer, eco-friendlier, and more inclusive. Across Germany, a plethora of real-world laboratories with HAVs providing novel mobility solutions in real-world settings has been implemented recently. Due to technological and legal restraints, a steward is required on board of the HAV in all of them. This on-board operator's task is overseeing driving operations and intervening if necessary, i.e., when the automation's capability does not suffice to maintain safe driving operations. Three major HAV projects are presented as case studies with a focus on the on-board operators' workplaces, their tasks, scenarios they are exposed to, and interactions with the driving automation to resolve these scenarios. After analyzing the projects' communalities and idiosyncrasies, structured interviews with on-board operators were conducted. The interviews focused on the operators' working environments, their tasks, and scenarios they were exposed to. Additionally, observations of HAV operations in the shuttles they supervise were carried out. The observations examined situations in which operators intervened, their frequency, and the ratio of automated versus manual driving periods. Results showed a highly similar task structure of on-board operators across the three investigated projects despite considerable differences regarding the HAVs' capabilities of automation, frequency of manual interventions, and the operational contexts. In addition, the set-ups of workplaces vary substantially, particularly regarding the transparency of the automation's decision-making process and ways to interact with the automation. Implications for psychologically grounded workplace design and further research will be discussed.

How do older people form social judgments based on emotional news from trusted and distrusted sources?

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"Scientist created virus in lab!". The spread of misinformation is a societal problem. When confronted with emotional news, the valence of the headlines affects social judgments, while the trustworthiness of the source is often neglected (Baum & Abdel Rahman, 2020). Investigating the effects of source credibility on social judgments in different populations will help shed light on underlying cognitive mechanisms. Due to age-related cognitive changes like deficits in content-source-binding and greater reported trust, older adults (OAs) are vulnerable targets of misinformation and need effective counter-strategies. This is illustrated by the fact that adults over 65 share more misinformation online than younger adults (Guess et al., 2019). In our online study, 30 OAs receive a cognitive intervention that consists of rating the credibility of well-known media sources before news is read. They are then presented with person-related news headlines (negative, neutral, positive) from trustworthy and untrustworthy media sources and asked to make a social judgment about the person that had been the subject of the headline. If OAs benefit from this intervention, we hypothesize that news from distrusted sources will lead to less emotionally valenced person judgments. Preliminary results of our pilot study ($n = 10$, with a mean age of 72 years) show that despite the intervention, the headline valence influences social judgment for both trusted and distrusted sources. However, results suggest an attenuated effect of headlines from distrusted sources on person judgment. We outline ideas for improving and testing strategies that can guard OAs against emotional misinformation.

How to measure the duration of an illusory motion: The case of the motion bridging effect

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When a rapidly rotating ring of points (inducer) is followed by a stationary ring of points (test ring) participants frequently perceive a short rotation in the stationary ring in the direction of the inducer. This illusory motion has been termed Motion Bridging Effect (MBE). The MBE occurs even if the inducer rotates at very high velocities so that the inducer appears to be a continuous outline of a stationary circle and participants cannot distinguish its direction of motion. The frequency of participants' reports of the illusory motion in the direction of the rapidly rotating inducer increases when the interstimulus-interval (ISI) between the two rings increases up to 90ms and decreases with longer ISIs. Ratings of the clarity of the illusory motion revealed a similar inverted u-shaped effect of ISI. Here we present a psychophysical measure to estimate the duration of the illusory motion. In two experiments, we employed a temporal-order judgment task in which participants rated whether the illusory motion ended before or after the occurrence of another (visual or auditive) stimulus. A double staircase procedure was

used to determine the moment of perceived simultaneity as an estimate for the perceived duration of the illusory motion. We found that the duration of the illusory motion decreases monotonically with increasing ISI with a unit slope. The double dissociation of the direction and the duration of the illusory motion over ISI is new evidence for multiple processes that contribute to the illusory motion in the case of the MBE.

How vergence influences the feeling of being looked at

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Perceiving other people's direct gaze is important for many areas of everyday living (Argyle et al., 1974). For horizontal and vertical eye movements the area of being looked at, also known as the cone of gaze, has been well explored. Previous research has shown a fairly large range of eye positions (about 4° to 9°) that people accept as being looked at (Gamer & Hecht, 2007). Although vergence is an important cue for perceiving the depth of fixation (Nguyen et al., 2018), it has not received much attention in the gaze research. This study investigates whether – comparable to horizontal and vertical eye positions – there is a range of different vergences that lead to the perception of being looked at. To this end, observers adjusted the degree of vergence of the lookers' eyes until they felt just looked at or until they felt just not looked at (factor 1). Additionally, the direction of adjustment (ascending, descending) was manipulated (factor 2). The results suggest that observers accept vergences of lookers focusing within an area of 7° in front of and 7° behind the observer.

Impact of perceived agency and empathy of a virtual human on social modulation of pain

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Pain is a multidimensional phenomenon and can be modulated by psychosocial factors like social support and empathy. The present study investigated the influence of social support and empathy on pain in a standardized way with virtual humans. In a mixed design, healthy participants were immersed in a virtual lab and underwent three within conditions. In two conditions, a virtual experimenter led the participants through the study and provided verbal support immediately before pain stimulation. At the beginning of one condition, the virtual experimenter was presented as empathic. In another condition, another virtual experimenter acted non-empathically. In a third condition, no virtual human was present and no verbal support given. Agency of the virtual experimenters served as between-subjects factor. In the avatar group, participants were led to believe that the virtual character was controlled by an employee next door. In the agent group, participants were told that they interacted with a computer. In both cases, the virtual human was controlled by computer scripts. In each condition, six heat pain stimuli were applied. Pain ratings and psychophysiological measurements were recorded. Preliminary data ($n = 34$) show a successful manipulation of empathy, $t(32) = 4.32$, $p < .001$, $d =$

.75. Post-study ratings concerning the perceived empathy were higher in the empathic (M = 7.9, SD = 2.2) than in the non-empathic condition (M = 3.78, SD = 2.65). Descriptively, pain ratings were highest in the non-empathic condition and lowest in the control condition. Agency did not affect pain ratings. The current study contributes to understanding virtual social support and its modulation of pain. This research also contributes to understanding how humans respond to virtual characters.

Individual differences in attentional performance of pre-schoolers influence how well they remember the content of electronic storybooks

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Multimedia and interactive features in electronic storybooks can improve information processing efficiency and recall performance in pre-schoolers. However, focusing attention on relevant information while ignoring several nonrelevant sources is problematic. Interactive features, in particular, can interfere with information processing because they might be a source of distraction and increase the cognitive load. Despite their importance, executive functions are usually not discussed in the literature of electronic storybooks. Thus, the goal of our study was to investigate how multimedia and interactive features in electronic storybooks may facilitate learning. We were interested in the influence of attentional performance and working memory capacity on recall performance in pre-schoolers. Participants (N = 30, M = 5.57 years) were exposed to three different stories in three separate sessions, saw two electronic storybooks (one with only multimedia and one with interactive features), and listened to one story (as baseline). After each session children were asked to answer 10 questions assessing how well they remembered the story. We measured children's working memory capacity and attentional performance in separate sessions. Caregivers filled out the ADHD Rating Scale-IV for each child. Our results indicate that multimedia and interactive features improve recall performance. However, we observed a positive relationship between recall performance and efficiency in sustained and selective attention in both the interactive and multimedia electronic storybook conditions. This effect was more emphasized in the interactive condition. These results highlight that digital educational environment should adapt to individual needs of the children.

Individual differences in eye movement parameters during action sequence learning

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During the last years numerous researchers reported for various eye movement tasks stable individual differences in parameters such as fixation durations and saccades. To date however, little is known about how these differences behave in tasks consisting of sequences of manual actions and how they evolve over the course of learning. Here, we

looked at individual differences of eye movement parameters while participants repeatedly performed an action sequence. More precisely, we conducted a computerized version of the Trail-Making-Test, which requires participants to click through a series of ascending numbers, or numbers and letters. They first completed a block of novel (trialwise changing) spatial arrangements of the task. Subsequently a fixed spatial arrangement was repeated multiple times. We compare both instances of learning, novel and fixed arrangements, looking at a variety of eye movement parameters and their respective development over time. Our results shed new light on the nature of individual differences in learning action-sequences and demonstrate systematic changes in eye movement control strategies.

Influence of body posture and stimulus eccentricity on the Simon effect

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Recent studies showed an influence of the vestibular system on various aspects of cognition ranging from visuospatial abilities and attention to executive functions (e.g. Bigelow & Agrawal, 2014). The vestibular system is particularly important in order to detect the position of one's own body in relation to other objects. Studies directly addressing the vestibular system are quite rare. Thus, in a first step, we manipulated the body position (e.g. sitting or standing) to investigate its influence on the Simon Task. Participants were asked to respond to the color of stimuli presented on the left or right side of the screen's center, yet the stimulus location was task-irrelevant. The stimuli occurred on three different eccentricities along the horizontal plane on either side of the screen's center in order to examine the spatial distribution of the stimuli on the screen (Hommel, 1993). Participants performed the Simon task twice, once while standing and once while sitting. Thus, the study comprised a 2 (compatibility: stimulus-response (SR) compatible vs. SR incompatible) $\times$ 2 (body position: sitting vs. standing) $\times$ 3 (eccentricity: low vs. medium vs. high) within-subject factors design. We conducted two experiments (one online, one in the laboratory). Both experiments showed a significant Simon effect, while the effect was seemingly unaffected by the other factors. Results are discussed regarding the role of the vestibular system for spatial representation and cognitive inhibition.

Inhibition-based dual-action benefits: The role of predictability

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Performing two actions at the same time usually results in performance costs. However, recent studies have also reported dual-action benefits: performing only one of two possible actions may necessitate the inhibition of the initially activated, but unwarranted second action, leading to single-action costs. Presumably, two preconditions determine the occurrence of such inhibition-based dual-action benefits: Firstly, there has to be dimensional overlap across action requirements. Secondly, the task situation should entail

unpredictability regarding the particular responses and response types from trial to trial, meaning that all response alternatives have to be kept active in working memory. In the current set of dual-action experiments, we tested the latter hypothesis by comparing 1) a pseudo-randomized mode of trial presentation to 2) intermixed, but fixed sequences of trial types and 3) a completely blocked presentation. As expected, dual-action benefits were strongly present in 1, but significantly reduced in 2, and absent in 3. This pattern of results is compatible with newer theories of multiple action control which assume that differential inhibitory costs in single-action trials are the root cause of dual-action benefits.

Intentional binding: A lack of correlation between interval estimation and the Libet clock

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Multiple methods are used to measure the temporal attraction between actions and their outcomes, called intentional binding. Results from studies using different methods seem to be interpreted interchangeably. The aim of our study was to measure intentional binding in the same participants using two common methods: interval estimation and the Libet clock. Previous research suggests that intentional binding depends at least partially on personal factors. Therefore we expected the binding from the two methods to be positively correlated. Using Bayes factors as a stopping criterion, 36 healthy adult students participated in the preregistered experiment. Task features such as action-outcome delay and action conditions were matched between the two methods. Bayes factors showed moderate evidence for the binding in the two methods to be uncorrelated. This suggests that different mechanisms underlie the binding effects in the two methods reported in previous research. We suggest further investigation of the available methods to build a reliable basis for understanding the processing of action-outcome relations.

Investigating solidarity in an increasingly unequal world: How do justice sensitivity, social dominance orientation and social identification interact for predicting solidarity-based actions?

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Which factors influence solidarity-based actions towards out-groups? Why do advantaged group members engage in action for disadvantaged groups? When are these actions in a hierarchy-maintaining vs. hierarchy-challenging manner? Led by these main research questions, we aim to investigate a model specifying the interplay of Justice Sensitivity, Social Dominance Orientation, and Social Identification on different levels of inclusion for solidarity-based collective action – thereby bridging personality and social-psychological perspectives. All three factors have been proposed as important determinants of behavior in favor of a group (e.g., collective action). However, a limitation of past research is the missing integrated perspective. A first study ($N = 119$) measured Justice Sensitivity and

manipulated the level of Social Identification (Europe vs. World) in order to test how these variables separately and in interaction affect perceived injustice, political solidarity, and helping intentions and behavior in favor of outgroups on both identification levels. Construct validity of the scales was given. Although we found theoretically meaningful correlations, our experimental approach in manipulating social identification was not yet successful. In the next step, we will aim to improve the manipulation of social identification as well as test the variables' added value for explaining and predicting the two different types of solidarity-based actions (i.e., hierarchy-challenging and hierarchy-maintaining). We discuss the adequacy of the model guiding our research as well as the use of different experimental designs.

It's more than the cost to act: The body state biases value-based decisions due to cognitive crosstalk

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Many human behaviors can be construed as nested multitasking, with a motor control task performed in the context of value-based decision making. For example, a child playing soccer may decide whether to pass an opponent to their left or right side while dribbling the ball. For such behaviors, it has been shown that movement influences value-based decisions due to the action costs resulting from the dynamically varying body state, leading to a bias for choices affording lower action costs. We show that the action cost effect found in previous studies might include cognitive crosstalk, that is, a bias due to a dimensional overlap between motor control and decision making. In our paradigm, participants controlled a cursor moving across one of three horizontal lanes. In each trial, the cursor was perturbed either upward or downward requiring a continuously performed mouse wheel movement counteracting the perturbation. When rewards on the upper and lower lane appeared, participants were required to make a value-based decision by moving the whole computer mouse forward or backward to jump to the upper or lower lane. We manipulated the dependency of decision movement lengths on the cursor state to disentangle action costs from the cursor state. It showed that the cursor state influenced decisions independent from action costs, with participants preferring jumps that dimensionally overlapped with the performed scrolling movement. This cognitive crosstalk was attenuated when participants had more time to decide and act. Our results complement the embodied choice framework in that not only action costs, but also further dimensional action features bias value-based decisions in nested multitasking.

Lab vs. online: A comparison of three different estimates of the audio-visual temporal binding window

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In this study, we probe whether individual differences in the audio-visual temporal binding window (TBW; i.e., the interval at which delayed auditory and visual stimuli appear to

emerge simultaneously) can be assessed reliably in online experiments. To do so, we evaluated the reliability of three standard tasks measuring the temporal binding window, namely the Temporal Order Judgment Task (TOJ), the Simultaneity Judgment Task (SJ), and the Two-Interval-Forced-Choice Task (2IFC), in a browser-based web experiment. Each participant ($N = 108$) completed each task twice on two consecutive days, either in the lab (using the same laboratory computer) or at home (using their individual computers). For each task, we calculated the TBW for each participant, and obtained the test-retest reliability across the two sessions. Regarding the temporal binding window, all tasks provided good reliability estimates, however, we observed substantially more data exclusions for the 2IFC and the SJ than for the TOJ (due to poor model fits). In all tasks, the width of the TBW was highly correlated with raw accuracy in the task. Since raw accuracy revealed higher reliability scores than the TBW, it might be worth considering using raw accuracy as proxy for individual differences in the TBW. Importantly, there were no substantial differences between the online- and lab-based estimates of the reliability scores. Therefore, the reliability scores in the online tasks cannot be attributed to systematic differences in the technical setups. We conclude that it is possible to study individual differences in the audio-visual TBW online. We made the code of all three tasks available, but we recommend using the TOJ.

Learning foreign words from semantic context

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Learning novel foreign vocabulary often occurs within a semantic context. Such context can be provided by sentences in which foreign words are embedded. These sentences can be predictive – they can lead the reader to believe that they can infer the correct translation – or nonpredictive – so ambiguous that the chances of predicting the translation are low. Previous research on prediction error suggests that such errors should boost memory compared to conditions where error is low. We thus investigated how presenting novel foreign words within predictive or nonpredictive sentences affects their memory. We presented foreign Finnish words at the end of predictive and nonpredictive sentences. Importantly, in predictive sentences the most obvious translation was never correct. Also, for half of the sentences participants were asked to guess the translation before being presented with the corrective feedback - they made overt predictions – and the other half of sentences presented the correct translation straightaway so that participants could only make covert predictions while reading. Experiment 1 tested associative recognition performance for correct translations when cued with their Finnish counterparts and only revealed better performance for words from nonpredictive than predictive sentences. Experiment 2 changed the test format to simple recognition and only revealed a benefit of overt compared to covert predictions. In Experiment 3 we tested memory for translations instead of Finnish words by cuing them with the sentences in which they were embedded at study, revealing a benefit of predictive sentences and overt predictions, but no interaction. The results suggest that the effects of predictiveness and overt vs. covert predictions are independent of one another.

Mirror, mirror in the words: A week of word frequency mirror effects

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The current study assessed whether the word frequency mirror effect in recognition memory changes across time. In an online study, we presented 192 M-Turk participants with a study list consisting of high- and low-frequency words and we tested recognition memory either immediately, after one day, after three days, or after one week. The result showed that the word frequency mirror effect is stable over time despite the general memory decline. These results indicate that the word frequency mirror effect is based on stable differences between representational features of high versus low frequency words rather than due to a temporary activation triggered by the study experience.

Motivational imagery of activities and pupil dilation: The emotional impact of episodic simulation compared to abstract verbal thought

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Mental imagery compared to verbal thought has been shown to amplify emotion, which may prove useful to motivate adaptive behaviours. So far, however, the majority of findings are based on self-report measures. We extended this literature to the physiological level by investigating this difference in emotionality between mental imagery and verbal thought using pupil dilation as a measure of emotional arousal (Preregistration: https://osf.io/93yvu). A final sample of 75 participants recruited from the general population listened to audio tapes describing an everyday activity in a positive manner. They were randomly assigned to an Episodic Simulation condition (ES; $n = 38$) or an Abstract Verbal Thought condition (AVT; $n = 37$). Participants in the ES condition imagined performing the activity described in the audio tapes, while participants in the AVT condition visualised the words constituting the descriptions. We conducted a mixed ANOVA controlled for mental effort with pupil dilation in one-second time bins and condition as factors. As predicted, ES led to greater pupil dilation than AVT. Self-reported emotionality assessed throughout the task also was greater for ES than AVT, yet no difference was found for subjective ratings of arousal, anticipated reward or motivation to perform the activity. Our findings support previous work demonstrating the superiority of mental imagery to verbal thought in amplifying emotion on a physiological level. The absence of a transfer to motivation, although expected, is in line with recent findings using verbal thought as a control condition to mental imagery.

Multinomial processing tree modeling of feature binding in long-term memory

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For some time, there has been a debate in cognitive psychology about how multiple features of an object are stored in long-term memory. Whereas the mutual cuing hypothesis posits that stored features are directly linked to each other, the binding variability hypothesis assumes that features are linked only indirectly via the object. Disentangling these two hypotheses experimentally poses a challenge, because feature retrieval is typically tested with object information present and thus, successful retrieval of features can be caused either by direct links between features or by idiosyncratic links between each feature and the object. In the present study, we aim to remedy this limitation: Participants learn a list of everyday objects with different combinations of two features (i.e., color and orientation). Subsequently, they perform a four-alternative forced-choice recognition test in which one old and three new feature combinations are presented. Importantly, only in half of the trials, the feature combinations are shown with the same objects as in the learning phase, whereas they are presented with new objects in the other half. We propose a multinomial processing tree (MPT) model to disentangle the processes underlying successful retrieval of feature combinations with and without the learned object being present. By means of this MPT analysis, we directly test whether retrieval of feature combinations is possible in the absence of object information (supporting the mutual cuing hypothesis) or not (supporting the binding variability hypothesis).

Multisensory descriptions in online shops: Effects on brand attitude, perceived tangibility and buying intention – an experimental study

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In a globalizing world, characterized by digitization and rapid technological progress, the increasing competition and barriers of online trading are forcing companies to proof the suitability of traditional marketing methods and rely on more appropriate approaches. Multisensory marketing is one of the methods, aimed to seducing the consumer by using their senses to influence their feelings and behavior. Multisensory descriptions are a form of sensory marketing, for which already positive effects have been shown. This study investigates the power of a congruent, multisensory product description to examine the influence on brand attitude, perceived tangibility and buying intention. An one-factorial online experiment in between-subject design was conducted. The experimental group evaluated a t-shirt within an online shop with a congruent, multisensory product description. The control group rated a t-shirt within an online shop with a congruent, non-multisensory product description. The results indicate that the type of product description has a positive influence on the intention to buy and on the brand attitude of consumers. Furthermore, it can be seen, that a congruent and multisensory product

description results in a higher perceived tangibility of the product. Further studies can validate the effect for other products and examine multisensory effects of pictures.

Multitasking and spatial abilities in middle childhood: Testing the spatiotemporal hypothesis

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Prior research in adults showed that spatial abilities contribute to multitasking performance, providing evidence that multiple deadlines are represented in a spatial manner (Mäntylä, 2013). In two studies, we tested this spatiotemporal hypothesis for the first time in children. In Study 1, 116 children (9–12 years) performed a touchscreen-based multitasking paradigm, asking them to monitor four different counters that ran at different paces, and to press a button whenever a counter had reached the end of its cycle. They also performed two mental rotation tasks measuring dynamic spatial abilities and two tasks assessing executive functions and visuo-spatial working memory. Regression analyses showed that spatial ability was an independent predictor of children's multitasking performance above and beyond age, executive functions, and visuo-spatial working memory. These results are the first to corroborate the prominent role of dynamic spatial abilities for children's multitasking. In Study 2, we aimed to replicate and extend Study 1 in children with 8 to 11 years. The procedure was identical to Study 1, with the following exceptions: Children performed the multitask paradigm with two and four timers, and also carried out tasks measuring static spatial abilities and verbal intelligence. We hypothesized that dynamic spatial abilities explain incremental variance in children's multitasking even when dual-task performance is accounted for. Together, the data showed supportive evidence for the spatiotemporal hypothesis in children and suggest that spatial abilities can play a critical role in coordinating multiple tasks.

Narcissism and error processing: Variations of admiration and rivalry with the error-related negativity and the error positivity

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The literature on narcissism suggests two contradictory ways how highly narcissistic individuals deal with failures: They might consciously avoid failures or vigilantly turn towards them as failures provide essential cues for the pursuit and protection of grandiosity. We tried to dissolve these (seemingly) contradictory positions by studying event-related potential components of error processing and their variations with narcissism. With a speeded Go/noGo task, we examined how the error-related negativity (Ne/ERN) and the error positivity (Pe) vary with Admiration and Rivalry, two narcissism dimensions (Back et al., 2013), under ego-threatening conditions. Using multilevel models, we showed that participants with high Rivalry displayed higher Ne/ERN amplitudes. We did not find variations of either narcissism dimension with the Pe. Thus, the results only supported

the second position, a heightened vigilance to errors at early, rather automatic processing stages (reflected in a higher Ne/ERN). However, future studies might find reduced conscious error perception at later processing stages (reflected in Pe variations) by distinguishing between an early and a late Pe (Endrass et al., 2007) and by considering the error evidence accumulation account (Steinhauser & Yeung, 2012). After all, if one respects the temporal dynamics of error processing and different narcissism dimensions, highly narcissistic individuals might show heightened vigilance to and conscious avoidance of errors.

Neuronal investigation of sensory specific satiety in relation to bodyweight and eating behavior

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Sensory specific satiety, or the phenomenon that the pleasantness of a particular taste declines when certain types of food are consumed to satiety, plays an important role in food choice and meal termination. Since changes in taste, smell and appetite are commonly observed in obesity, previous studies investigated the relation of sensory specific satiety to weight gain, but observed conflicting results. To gain a more detailed understanding of the relationship between sensory specific satiety and weight homeostasis, we examined the rewarding effect of sugar in a group of 30 healthy participants with a body mass index ranging from 17.5 to 35kg/m^2. We employed a gustatory stimulation paradigm designed to induce sensory specific satiety for glucose. During fMRI scanning, glucose and water are applied orally using a gustometer. Furthermore, relevant hormonal satiety parameters are measured, as well as dietary behavior and food preferences in everyday life. This will allow us to assess neuronal stimulus processing in relation to the sensory satiety level and to investigate the relationship with everyday eating behavior. A better understanding of factors contributing to the development and maintenance of overweight are crucial for the development of new treatment options for obesity. Data collection is at an advanced stage, so that we can present a provisional data evaluation at the conference.

Neurophysiological evidence reveals no attentional capture by salient but task-irrelevant abrupt onset cues in difficult color search

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According to the Attentional Dwelling Hypothesis, irrelevant abrupt-onset cues capture attention in a stimulus-driven way, and attention then dwells at cue position until target display onset. As a consequence, search can be facilitated if a target is presented at the cued location (in valid conditions) relative to presenting the target away from the cue (in invalid conditions). Critically, effects of stimulus-driven capture can go undetected when search is too easy. Here, we used both behavioral measures (i.e., cueing effects and distractor-compatibility effects in reaction times and error rates) as well as event-related

potentials (N2pc effects) to test if irrelevant abrupt-onset cues captured attention and if humans engaged in processing of visual information at the cued locations. Even under difficult search conditions, we found no direct electrophysiological or behavioral support for the Attentional Dwelling Hypothesis. In addition, regarding behavioral cueing effects, results from a follow-up experiment pointed toward choices made in experimental designs as well as in data preprocessing as moderating factors for if or if not evidence in favor of the Attentional Dwelling Hypothesis can be found.

Noradrenergic modulation of computational noise in value-based decision making

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Reinforcement learning has proven to be an invaluable framework when it comes to understanding value-based decision making and learning. However, the behavioral phenomenon of choice variability defies standard reinforcement learning models and still lacks a mechanistic explanation. In a recent study, Findling et al. (2019) show that this seemingly suboptimal and irrational behavior in humans is best accounted for by a novel reinforcement learning model which incorporates computational noise as an additional source of choice variability. The idea of computational noise states that learning from experience is only precise to a certain degree, i.e. there is trial-to-trial noise corrupting the updating of expectations. Moreover, this research suggests, that the modulation of this computational noise (or precision) is governed by the level of noradrenergic (NE) activity in the brain. In the current study, we investigate both proposals by combining a pharmacological manipulation of NE (atomoxetine) with electrophysiological recordings in an established variant of the two-armed bandit task. We hypothesize that increased NE levels are associated with increased computational noise and that this relation is reflected on the behavioral and neural level. We replicate previous findings and establish clear connections between model variables (e.g., reward prediction error and trial-to-trial computational noise) and EEG. However, contrary to our expectations, we do no find evidence for a modulation of these effects by noradrenaline. Taken together, these findings support the conceptualization of reinforcement learning as a noisy process, calling for further research on its biological implementation.

Norm conflict between ingroups: Dissonance within the social self

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People usually have different in-group memberships. However, the norms of these groups can be contradicting, which may elicit dissonance within the social self. This is different from dissonance at the individual level because it stems only from people's membership

in ingroups with conflicting norms. Building on Social Identity Theory and Cognitive Dissonance Theory, we test whether norm conflict between ingroups increases psychological discomfort as a measure of dissonance. Not only is norm conflict between ingroups an inconsistency in important aspects of the self; it also leads to a goal conflict created by opposite ingroup norms and should therefore be strongest for people who are highly identified with both groups. In a first experimental study ($N = 404$), we investigated how people experience and respond to conflicting ingroup norms. To rule out conflict between personal and social norms, we separately analysed data from a subsample of participants ($N = 109$), who had no previous opinion on the topic of the norm. Norm conflict was manipulated by presenting the results of a bogus survey, indicating that two ingroups agreed or disagreed on the topic of mandatory blood donation. The results of the experiment revealed a main effect of norm conflict on psychological discomfort as a measure of dissonance. An interaction effect of norm conflict and ingroup identification indicated that persons with low identification levels for both groups were less likely to experience psychological discomfort in reaction to norm conflict. Distancing from the ingroups and downplaying the credibility of the norm manipulation emerged as strategies to cope with salient normative conflict. A preregistered replication study is planned, and its results will also be presented.

Overlapping processes during episodic retrieval – the involvement of alpha/beta oscillations in attentional selection during episodic memory retrieval

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While the importance of pattern reinstatement during long-term episodic memory (eLTM) retrieval has been long recognized, it is difficult to assess retrieval independently from attentional processes at the level of scalp topography. Previous studies suggested that switching the focus of attention within working memory representations is associated with alpha/beta oscillations (8 – 20Hz), while the same activity has been also linked to pattern reinstatement during eLTM retrieval. The current design allows us to measure independently the two processes reflected in alpha/beta-band activity. In the encoding phase, subjects were presented with an object on a certain position on the screen (left, tight, top or bottom) and their task was to imagine it on a new position for later report. In each trial, either the task-irrelevant presentation position or the task-relevant imagination position was lateralized. In the retrieval phase, objects were centrally presented and subjects were required to make an old/new judgement, followed by the report of the imagination position associated with each old object. Changes of lateralized alpha/beta activity reflecting pattern reinstatement would predict similar topographical effects during encoding and retrieval. Conversely, the influence of attentional control processes during retrieval would be associated with the suppression of alpha/beta power contralateral to the to-be-reported imagination position and a contralateral increase relative to the irrelevant presentation position. Our results support this latter pattern. This shows that an experimental differentiation between selective attention and pattern reinstatement is necessary when studying cortical reinstatement processes during eLTM retrieval.

Phasic alertness increases congruency effects in the flanker task for both spatial and non-spatial targets

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Various studies have shown that phasic alertness increases congruency effects in the flanker task. Yet, the mechanisms that drive this paradoxical effect are still being debated. In the present study ($N = 38$), I further investigated potential boundary conditions for observing the alerting-congruency interaction. Specifically, I examined whether alertness increases congruency effects only if the target is spatial in nature. For this purpose, I designed a flanker task in which I varied the stimulus type used for the target and the flankers: In separate blocks, the target and the flankers were either left- or right-pointing arrows (spatial stimuli) or the letters H and S (non-spatial stimuli). To induce phasic alertness, I presented an auditory alerting signal (AS) before the flanker display in half of the trials. As expected, I observed solid effects of phasic alertness and congruency on reaction time: Participants responded faster in trials with an AS than in trials without an AS, and they responded slower in incongruent than in congruent trials. Furthermore, replicating previous findings, the congruency effect was larger for arrows than for letters. Most importantly, however, a reliable alerting-congruency interaction was observed for both stimulus types, even though it was (numerically) larger for arrows than for letters. Summarized, these results show that the alerting-congruency interaction does not depend on a spatial target itself, but may rather depend on the ability to form stimulus-response (directional) associations.

Post-saccadic masking: The extent and time course of perceptual omission of intra-saccadic smear for a wide range of natural scenes

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Each saccade that we make results in high-velocity image shifts on the retina, inducing large-field motion blur, which is rarely perceived during natural vision (a phenomenon known as saccadic omission). In a unique setup, in which they illuminated a room strictly during saccades, Campbell & Wurtz (1978) showed not only that such intra-saccadic smear can be perceived, but also that stable pre- and post-saccadic retinal images suffice to eliminate the percept. Despite the impact of this finding, still little is known about the time course and extent of post-saccadic masking when induced by a larger variety of natural scenes. In this study, we tachistoscopically flashed natural-scene stimuli of different categories (e.g., indoor scenes, residential areas, woodlands) upon the onset of saccades. We presented scenes in color or grayscale and systematically varied their durations ranging between 33.3 and 58.3ms, leading to either strictly intra-saccadic or post-saccadic presentation offsets. After an inter-stimulus interval of 500ms, we presented a second scene, prompting observers to determine whether it was the same or a different one. Performance in this same-different task was low (yet clearly above chance) for purely

intra-saccadic presentations but strongly depended on scene features, such as color and scene category, as well as spatial-frequency and orientation content. Only 10-20ms of post-saccadic presentation sufficed to achieve near-ceiling performance, irrespective of scene features. This time course suggests that the post-saccadic masking of the extensive motion smear induced during saccades is akin to bandwidth-specific backward masking (Stromeyer & Julesz, 1972) and may be a parsimonious visual mechanism for saccadic omission.

Processing contextual information: The role of memory and plausibility

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The understanding of the discourse depends on an individual's ability to integrate new information into a given context. A discourse appears plausible if (i) a reference is possible to information that was already mentioned in the context or (ii) relations can be inferred from semantic context. In two online rating studies, we investigated the role of memory and semantic plausibility on discourse understanding. Participants listened to several context sentences followed by a verbal test sentence including a critical noun phrase. The definite determiner of the noun phrase presupposes the existence of a target noun in the context, whereas the indefinite noun phrase presupposes its non-existence. These presuppositions were either fulfilled or not. To investigate whether detection of fulfilment depends on memory, in Study 1, we manipulated the sequential position of a potential target (far or near to critical noun) within the context. In Study 2, semantic coherences was established by a plausible or implausible context for a noun phrase, which was not mentioned in the context. Participants rated the adequateness of the test sentences relative to the context. In Study 1, ratings depending on presupposition fulfilment were less extreme for far distances than for near ones. This result indicates that presupposition violations seem to be more severe for entities highly present in memory than for those mentioned a longer time ago. In Study 2, ratings were influenced by plausibility, but not by presupposition fulfilment. This result indicates that global semantic context dominates more local reference violations evoked by presupposition processing. Altogether, the two studies show that the way how presuppositions are processed is influenced by memory and semantic plausibility.

Processing of German-English interlingual homographs and the role of culture in a lexical decision task

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We investigated the organization of the bilingual lexicon by analyzing how interlingual homographs (IH) - words with identical writing in at least two languages - are comprehended. Using a lexical decision (LD) task, we examined if the distributional semantic similarity between prime and target predicted LD times in a priming experiment (using

exclusively IHs and pseudowords). Participants' L2 was made salient by using L2 for instructions and by a picture description task where participants had to describe cultural anchor points at the start of the experiment. Only participants living in a country where their L2 was the official language were recruited, which was either English native speakers in Germany ($N = 45$) or German native speakers the UK ($N = 45$). We expected to find cosine similarities in participants' L2 to be predictive for LD times as the experimental setting made participants' L2 salient. Contrary to expectations, model comparisons showed no significant effect of cosine similarities of participants' L2, suggesting that semantic similarity between words in participant's L2 did not influence word comprehension in this experimental setting. A post-hoc comparison revealed that only for German participants living in the UK, cosine similarities of participants native language were a significant predictor. These results suggest that cosine similarities can be predictive for participants' reaction times in an LD task even when exclusively using IHs, but that bilinguals may process homographs in their L1 even if their L2 has been made salient.

Psychophysical functions in the perception of confidence interval plots and boxplots

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Visualization of data is a crucial part of data analysis and communication. The design of data graphs should support accurate perception. Nonlinear relationships between graphical elements and their perception, as past research with scatterplots has found, can threaten accuracy and give rise to design adjustments. In the present study ($N = 90$), we investigated psychophysical functions among two widespread data graphs representing quantity by line segments: confidence interval plots and boxplots. Regarding the confidence interval plots, the relationship between length of the interval and amount of perceived uncertainty was analyzed. Regarding the boxplots, the relationship between box-size and amount of perceived variability was analyzed. Additionally, in both data graphs, position (top, middle, bottom) and orientation (horizontal, vertical) were varied. The results are reassuring in that they showed relatively consistent linear relationships across both data graphs, positions and orientations.

Reducing processing load while solving complex machining tasks – results from an experimental online study

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Currently, technical control systems often consist of many variables and their interactions that must constantly be monitored and adjusted. Thus, operators' processing capacity can be exceeded, which might result in errors. Therefore, strategies to enhance working memories efficiency, such as conceptual chunking (i.e., the storage of smaller units

of information and their relations into larger units), are needed (Halford et. al 1998). Graphs might intensify conceptual chunking, because they employ general perceptual cognitive mechanisms effectively. The present study aimed to investigate if it is possible to make complex machining tasks more efficient by using representations that should induce conceptual chunking compared to ones that should constrain conceptual chunking. For this, an experimental online study was conducted using simplified versions of real thermal spraying displays. Eighty-three participants (mainly students) were randomly assigned to one of two test conditions in which the relevant information was presented using visual representations that should induce or constrain conceptual chunking (i.e., coordinate systems versus bar graphs). We found a significant difference between the test conditions regarding reaction time, indicating that the interpretation of graphs that should induce conceptual chunking was faster than the interpretation of the unchunked versions. However, test material had some limitations (e.g., regarding difficulty) and the online format proved to be unfavourable. Therefore, improvements regarding further research are proposed.

Reducing the flanker effect with a repeating sequence of conflict levels?

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In the Eriksen flanker task (Eriksen & Eriksen, 1974), the presence of irrelevant flanker stimuli, surrounding the target, induces response activation that can be either congruent or incongruent to the required response. As a result, responses are slower with incongruent than with congruent (or even neutral) flankers; the flanker effect. Researchers have employed proportion congruency (PC) manipulations where the frequency with which irrelevant information conflicts with relevant information is varied. As a result, the flanker effect is smaller in contexts with high than with low proportions of conflict. It is assumed that during a learning phase, associations between features of the conflict-predicting context and the respective most frequently applied control-set are acquired. Encountering that context later again will then automatically activate the respective control set. In the present study, we investigated whether another form of context manipulation might lead to similar control adjustments. Across 6 blocks, incongruent (I), neutral (N), and congruent (C) trials occurred in a repeating 6-element sequence (e.g., C-N-C-I-N-I). We hypothesized that the participants incidentally learn this sequence so that, over time, the cognitive system might become similarly prepared for upcoming conflict as in a PC manipulation. As a result, the flanker effect should become smaller across the sequence blocks, but should increase again in a subsequent random block. One first (online) experiment ($N = 32$) provided mixed results. The hypothesized interactions were partially present in the error rates, but not in the RTs. Therefore, in a second (lab) experiment, we prolonged the learning phase and omitted neutral flankers to reduce the complexity of the sequence. Results are pending.

Reducing the SNARC effect by reversing the stimulus-response assignment

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Consistent stimulus-response (S-R) practice (i.e., repeatedly applying an arbitrary S-R assignment in a consistent manner) is assumed to result in automatic S-R translation due to the formation of associations along which responses are activated by perceiving a corresponding stimulus of the practiced set, even in the absence of an intention to execute the practiced task. Application of a divergent S-R assignment after practice therefore likely requires executive processes in the service of overcoming such conflicting activation. These control processes may evidence themselves by interacting with basic processes involved in completing a given task, such as implicit categorizing of nominally irrelevant stimulus information. To investigate the impact of having to adapt practiced response selection on implicit processing, participants made parity judgments on visually presented digits by means of pressing response keys located on their left vs. right side, thus allowing us to assess the SNARC effect. After the first half of the experimental session (i.e., after 4 blocks of 64 trials each), the parity-response assignment was reversed. This reversal was associated with a reduction of the SNARC effect resulting from selectively slowed responding in SNARC-congruent trials. The reduction notwithstanding, a substantial Congruency Sequence Effect (i.e., lower SNARC effect after incongruent than after congruent trials; CSE) was found in both phases of the experiment (i.e., pre-reversal and post-reversal, respectively). Our results may reflect a ceiling effect for conflict in incongruent trials or a reversal-induced switch to a more controlled processing mode. Changing the S-R assignment after practice offers new options for investigating mechanisms underlying the CSE.

Relationship between bullying experience and electrophysiological perception of physical pain

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Social exclusion is often perceived as painful by the victim. Previous studies showed that social pain is processed in similar brain areas as physical pain. Bullying, particularly the experience of social exclusion could hence lead to the victim being constantly exposed to a feeling of pain, which in turn seems to alter the perception of pain. Little is known about the underlying changes in the neural processing due to exposure of bullying as well as the relationship between the exposure to bullying and the change in physical pain perception. We investigated the electrophysiological correlates of physical pain perception depending on the bullying experience. Furthermore, the relationship between individual bullying experience and sensitivity to rejection was of interest. We used 60 color pictures showing a person's hands in painful ($N = 30$) or non-painful ($N = 30$) situations within a Go/NoGo response paradigm. 60 young women have to decide whether in the current trial the same picture as in the previous trial was presented, while event-related potentials (ERPs)

were recorded. Individual bullying experience and rejection sensitivity were assessed. Compared to the participants without any bullying experience, participants with that experience showed a smaller nociceptive evoked potential (NEP) when watching to painful pictures (relative to non-painful). Moreover, there was a negative correlation between the NEP and the extent of sensitivity to rejection. No differences were found in later ERP components related to pain processing. Our results suggest that individuals with bullying experience showed a greater fear of social rejection and seem to pay less attention to potential painful stimuli.

Relative source credibility affects the continued influence effect of misinformation

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The Continued Influence Effect (CIE) refers to the phenomenon that retracted information often continues to influence people's judgments and inferences. The CIE can be rational if the source that retracts the information (the retractor) is less credible than the source that originally presented the retracted information (the informant; Connor Desai et al., 2020). Conversely, people should show no CIE if the retractor is more credible than the informant. Thus, a rational CIE should depend on the relative source credibility of informant and retractor. Past research showed that retractor credibility influences the CIE. However, neither the influence of informant credibility nor that of relative source credibility has yet been investigated experimentally. To create groups with varying relative source credibility, we simultaneously and independently manipulated informant credibility and retractor credibility in two experiments ($N = 151$ and $N = 146$). Participants read a fictitious news report in which to-be-retracted information and a retraction were each presented either by a reputable journalist (high-credibility source) or by a discredited blogger (low-credibility source). As expected, the relative source credibility of informant and retractor affected the CIE. When the informant was at least as credible as the retractor, participants showed a CIE compared to control participants who saw neither the information nor the retraction. The CIE was strongest when the informant was more credible than the retractor. When the informant was less credible than the retractor, participants showed no CIE compared to control participants. These findings are in line with a rational account of the CIE.

Relevance of brain volume control in sex classification

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Recent studies addressed the question how males and females differ with respect to the structural brain organization by employing a machine-learning (ML)-approach where neuroimaging datasets are used to train a classifier to predict the sex based on structural brain features also for unseen subjects. In this approach it must be ensured that clas-

sification is based on the underlying input of GMV and not only adapts to the total intracranial volume (TIV) which is the most prominent difference between male and female brains. Therefore, the present study aims to control for TIV in two different ways when examining to which level sex can be predicted from the grey matter volumes: As the first alternative, we employed a ML-classifier that we trained on the GMV-structure of a sample of males and females that were matched either for age (AM) or matched for age and TIV (ATM) to control for TIV. The second way to control for TIV was provided by removing this information as a confounding variable from the analysis. The resulting four trained models were applied on AM and ATM test samples. The results revealed an accurate sex classification that depended on the way TIV was controlled for: The training on the AM-sample led firstly to 96.58% accuracy, but removing TIV as a confound led to a decreased accuracy of 62.11%. However, training on the ATM-sample resulted in stable accuracies of 86.34% without and 85.09% with additional confound control in the ML-analysis. We can conclude that the matching approach for TIV is a more appropriate control of TIV than the confound removal, as the results display stable accuracies that do rely on the TIV indicating underlying sex differences in the grey matter brain structure that may also predict the sex of even unseen persons.

Restoration of endocrinological and neuronal satiety regulation after bariatric surgery

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Obesity and overweight are major health problems, with increasing prevalence rates worldwide. The responsiveness to behavioral weight loss treatment is limited; only a subgroup of people responds with substantial and persistent reduction in body weight. Bariatric surgery is an effective treatment for severe obesity. Previous studies found that weight loss following these procedures is achieved mainly through reduction of hunger, increased satiation during a meal and changes in food preferences, rather than physical restriction in food intake. Changes in homeostatic control of caloric intake as well as restoration of hypothalamic functioning might play a pivotal role in this transition. However, the interaction between recovered homeostatic control and the contribution of hormonal changes on the role of weight loss and food preferences after bariatric surgery is unclear. To investigate this interaction, the present study enrolled 20 participants with obesity (BMI 35–55kg/m^2), planning to undergo bariatric surgery. To assess metabolic gut-brain signaling, participants will undergo fMRI scanning 2 weeks before and after surgery. Blood samples are collected to quantify hormonal satiety signals and food preferences as well as eating behavior are assessed via questionnaires. We expect to observe alterations in hormonal satiety signaling, hypothalamic reactivity and neuronal food reward processing. The proposed project could make it possible to differentiate the contributions of the individual parameters to the observed weight loss and thus better understand the underlying effective factors. Data collection is in an advanced state, so we will be able to present provisional data.

Revealing mechanisms underlying individual differences in multitasking: A drift diffusion model analysis

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The degree to which two or more tasks can be carried out in parallel has attracted a large body of research in the last decades. More recently, approaches have been proposed which also consider individual differences in processing. They demonstrate that some people tend to process two tasks in parallel, whereas others pursue a more serial processing strategy. Yet, when interested in individual differences in multitasking, researchers face a methodological dilemma. In order for an individual to adopt their preferred processing mode within a paradigm, the respective paradigm has to be less controlled. At the same time, less controlled paradigms are unsuitable to pinpoint the specific processes and mechanisms which underly these individual differences. In the present study, we tried to circumvent this problem by applying cognitive modeling techniques. In particular, we assessed individuals' preferences for a more parallel versus serial processing mode using the Task Switching With Preview (TSWP) paradigm. Subsequently, we aimed for insights on corresponding differences in the underlying processes using a drift diffusion model. Our results suggest remarkable individual differences, which were particularly prevalent on switch trials. In these trials individuals using a parallel instead of a serial processing mode tend to use the preview of the switch stimulus to optimize switching performance. Specifically, we found that they required less evidence to determine a response on a switch trial while showing clear evidence of parallel running non-central stages (i.e., task-set reconfiguration, perception and/or motor execution).

Revisiting valence in visual search tasks

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In two prior studies, we observed that valence affects visual search times (presented at TeaP 2021, Ulm). In one experiment, positively and negatively conditioned targets were detected more quickly than neutral targets. In the second experiment, we observed a reduction of the response time difference between two set sizes of stimuli (8 and 16) for negatively conditioned targets, suggesting that negative valence facilitated target search. Here we present three experiments to investigate further possible effects of valence on reaction time in a visual search task in accordance to set size as well as in regard to feature and conjunction search. This will provide further information on the parameters when valence appears to be a salient stimulus feature leading to exogenous attention, enhancing stimulus processing and thereby reducing search times. In Experiment 1, targets were paired with positive images, and in Experiments 2–3 targets were paired with positive, neutral, or negative images during evaluative conditioning. In Experiment 1, feature and conjunction search was contrasted at two different set sizes (8 and 16 items). In Experiment 2, participants were asked to conduct a feature search with two different set sizes of stimuli (8 and 16), and in Experiment 3, set size (16 items) was held constant

across trials for both feature and conjunction search. Differences in reaction times were expected between neutral and negative as well as neutral and positive targets.

Samply: A web and smartphone application for conducting experience sampling studies

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Conducting an experience sampling study on smartphones is a complex undertaking. We developed Samply software to help researchers set up and manage a study without having to program a mobile application (Shevchenko, Kuhlmann, & Reips, 2021). Samply consists of the website, which allows researchers to design studies, schedule notifications, and monitor participant responses, and the Samply Research mobile application, which is available to participants on Google Play or the App Store. The app provides interval- or signal-dependent types of scheduled notifications and allows randomization between participants. The content of the notifications is fully customizable and can include links to studies created with other services such as Qualtrics, Google forms, WEXTOR, or lab.js. Samply also supports event-based notifications triggered by participant geolocation or custom events specified by researchers. Potential applications for Samply include longitudinal studies, clinical trials, and human-computer interaction studies. The project has open source code and is available at https://samply.js.org.

Searching while loaded 2.0

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When searching for something, we usually need to compare the visual inputs of our surroundings with our mental representation of the object of search. Prevailing theories propose that visual working memory (VWM) is involved in this process of comparison. If that were the case, loading VWM should interfere with our ability to efficiently perform a search. A recent study by Drew et al. (2016) investigated this theory by loading participants' VWM with a number of different tasks and found little to no effect on their search performance. The study at hand aimed at examining the influence of a loaded VWM on hybrid search tasks in a more realistic search setting, moving away from a strictly 2D search array. Participants looked for objects that appeared as framed pictures on the wall of a room and navigated left and right using the arrow keys. Target objects were memorized prior to search in two blocks of 2 and 16 items, respectively. Visual Set Size of the search environment varied between 8 and 16 stimuli per array. Surprisingly, our results showed that participants were not slowed in their search when we loaded their VWM. However, whenever the target was present, a loaded VWM did decrease participants' search efficiency, especially when the pool of possible targets was already big. These findings are partly in favor of theories proposing a role of VWM in the representation of objects and their comparison to our real-world surroundings. They stand in contrast to the results found by Drew et al. (2016), suggesting that the effect of

VWM load was not traceable in a more superficial search setting.

Seeing it differently: The AmbigObj stimulus-set depicting ambiguous drawings of small-large and animate-inanimate object pairs

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Efficient and robust object perception can be challenged by noisy and ambiguous input. Our visual system is dealing with this problem by a hierarchy of low-, mid- and high-level representations that interactively shape our visual experience. To better understand the individual contributions of these different levels to object-selective neural and behavioral responses, previous studies developed stimulus sets to separate "lower" and "higher" representations of object categories. For example, images of objects were reduced to unrecognizable textures that only preserved mid-level texture and form information, or were chosen such that visual (e.g. shape) and semantic properties (e.g. categories) of objects could be dissociated. Here, we introduce the AmbigObj stimulus-set consisting of shape-matched images from small vs. large objects (e.g., broccoli vs. tree) and animate vs. inanimate objects (e.g., snake vs. rope). Crucially, we complemented each of these object pairs with a customized ambiguous drawing, compatible with either categorical 'high'-level interpretation (e.g., either a broccoli or a tree). In two rating studies (Nsize = 35; $N_{\text{animacy}} = 28$), we investigated the perceptual similarity of drawings and real objects, as well the perceived properties of these stimuli (e.g., shape, real-world size, vividness). Results confirmed that our ambiguous drawings are compatible with multiple perceptual interpretations. Together, drawings and measurements define a well-controlled stimulus set, which can be used to isolate effects of different categorical interpretations with identical input. We plan to make these stimuli publicly available and currently use them to study the role of learned interpretations for Stroop effects and ventral stream representations.

Selective directed forgetting of motor sequences

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Applying a newly designed variant of a three-list approach to selective directed forgetting of motor sequences, we were able to distinguish between the prominent accounts of selective directed forgetting. Participants consecutively studied three lists (L1, L2, and L3) of four sequential four-finger movements each. After studying L2, participants in the forget group were instructed to selectively forget the just now studied four items of L2 but to retain the previously studied four items of L1, whereas the remember group participants did not receive any forget instruction for L2 but were encouraged to retain all items of both lists. In addition, we switched (switch groups) or repeated the items-enacting hand (no-switch groups) between L2 and L3 for a manipulation of post-forget-cue material competition (i.e., interference) for L2. A final memory test assessed recall performance for

all three lists irrespective of preceding instructions. Selective directed forgetting (lower L2 recall in the forget group as compared to the remember group and higher L1 than L2 recall in the forget group) only occurred if the same hand was used for L2 and L3 (high interference between L2 and L3 encoding) whereas no selective directed forgetting occurred if the hand switched between L2 and L3 (low interference between L2 and L3 encoding). These results suggest that an inhibitory mechanism caused (selective) directed-forgetting costs that was triggered when items studied after the forget instruction had the potential to interfere with already stored items (i.e., were to be enacted by the same hand). When subsequently studied items pertained to the other hand no directed-forgetting costs occurred.

Sensory attenuation to multisensory stimuli

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Previous research showed that the sensory consequences of self-initiated sounds are attenuated as indicated by the auditory N1 suppression effect compared to externally-initiated sounds. This effect has also been shown in the visual domain, however, here, self-initiated pictures triggered either an attenuated N1 response or an enlarged N1 response. The present study investigated with cross-modal stimuli and employes three conditions, an auditory condition with self-initiated sounds, a visual condition with self-initiated pattern reversals of a checkerboard, and an auditory-visual condition with simultaneously occurring self-initiated sounds and pattern reversals. For each condition, externally-generated sounds or pattern reversals were collected in a separate block in order to compare them with the self-initiated ones. The physical features of each stimulus in the self-initiated and externally-initiated conditions were completely identical. EEG was recorded from 27 subjects. Initial analyses indicated differences between the self-initiated action effects and the externally-initiated ones in the N1 and P2 time range. Those N1 and P2 differences were further modulated by the different conditions. Preliminary results showed sensory attenuation in those conditions including auditory stimuli. Our results have important implications for understanding how perception could be influenced by self-initiated sensations across different sensory modalities

Separating interference and facilitation in backward crosstalk

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In dual-task studies with tasks in which responses have a spatial overlap, activated Task 2 response information exhibits an influence on Task 1 response selection. This is known as the backward crosstalk effect (BCE). The BCE might occur because Task 1 performance improves when Task 2 requires a spatially compatible response or because Task 1 performance becomes worse when Task 2 requires a spatially incompatible response. In other words, Task 2 response information might have a facilitatory or interfering effect.

The present study separates these aspects by using neutral trials within a dual-task. On these neutral trials, Task 2 required a spatial response that did not overlap with the one necessary for Task 1. The results suggest that the BCE reflects both facilitation and interference effects of equal magnitude. This conclusion is backed up by modelling efforts and simulations within a recently developed diffusion model framework (Koob, Ulrich, & Janczyk, 2021, Psychological Review; Ulrich, Schröter, Leuthold, & Birngruber, 2015, Cognitive Psychology). The framework can explicitly describe the influence of Task 2 response information for each individual in compatible and incompatible trials. In sum, the results so far suggest that the BCE involves both facilitation and interference to a similar degree.

Singing at the cocktail party – voice distinctiveness reduces change-deafness in multi-singer scenes

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Distinctive voices are thought to stand out of a crowd and should therefore facilitate stream segregation of simultaneous voices. We tested this hypothesis using auditory scenes comprising three simultaneous voices of young adults, all uttering the same sustained vowel. Voice distinctiveness was manipulated using voice caricaturing. According to the MDVS framework, caricatures and anti-caricatures, increase and decrease acoustic differences of a given voice relative to an average voice, respectively. In an online study, 14 participants rated caricatured voices as more distinctive than anti-caricatured voices. Afterwards, they compared two consecutive multi-singer stimuli (S1 and S2) in an object disappearance paradigm: S1 stimuli contained three voices, one of which (target voice) was caricatured, anti-caricatured or unaltered. S2 was either identical to S1 (same trials) or lacked the target voice (different trials). As predicted, matching performance was highest for trials containing voice caricatures. This suggests that voice caricaturing enhances perceived distinctiveness and reduces "change-deafness" in multi-singer scenes. It remains to be determined, exactly which acoustic parameters contribute to this effect and if these findings generalize to more complex utterances.

Smartphone's effect on our attention

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Introduction: Smartphones have a lot of functions that can replace most of our devices. Today's smart device dependency can lead to that many people saying they can't put down their smart device. The most vulnerable are the young adults, who are the fastest to become professional users of the devices. This age group is the most anxious about missing out on information, or simply not having someone respond to their messages. This can cause anxiety and distress, lead to individuals paying too much attention to their phone. Aims: The aim of the present research is to investigate the effect of the presence of a smartphone in a deprived setting in a simple attentional test measuring at-

tention wandering and reaction time while the participants have their smartphone on the desk next to them. Method: The sample comprised 47 participants (20 men; $M = 23.5$ years). The participants had to take part in a psychomotor vigilance test (PVT) while their smartphones were placed next to them, with or without available Internet. At the end of the session each participants had to fill out questionnaires to assess problematic internet use, smartphone addiction, fear of missing out. Results: We found no significant differences between the study and control groups in the terms of their performance on the PVT. However, the statistical analysis showed a moderately strong correlation between the results of the questionnaires examining smartphone use and their performance. Conclusion: Although the statistical analysis did not support our hypothesis, we can draw some important conclusions. Based on the questionnaires we can assume that there is a potential connection between the smartphone usage and attention.

Social metacognition drives costly commitments

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Showing or telling others that we are committed to cooperate with them can boost social cooperation. But what makes us willing to signal our cooperativeness, when it is costly to do so? In two experiments, we tested the hypothesis that agents engage in social commitments if their subjective confidence in predicting the interaction partner's behavior is low. In Experiment 1 (preregistered), 48 participants played an iterative version of the prisoner's dilemma game where they could signal their intentions to their co-player either for one or for two rounds by enduring a monetary cost. As hypothesized, low confidence in one's prediction of the co-player's intentions was associated with a higher willingness to engage in costly commitment. In Experiment 2, 31 participants had the option to signal their intention to cooperate for the current round but received feedback on the other's decisions according to three conditions: 100%, 50% or 25% of the time. Here, we replicate our previous findings and moreover provide causal evidence that experimentally lowering the predictability of others' actions (and thereby confidence in these predictions) motivates commitment decisions. Finally, across both experiments we show that metacognitive accuracy in mentalizing predicts the degree to which agents benefit from commitment devices. Taken together, our findings shed light on the importance of confidence representations and metacognitive processes in social interactions.

Socio-cognitive, expertise-based and appearance-based accounts of the other -"race" effect in face perception a label-based systematic review of neuroimaging results

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Two competing theories explain the other-"race" effect (ORE) either by greater perceptual expertise to same-"race" (SR) faces, or by social categorization of other-"race" (OR)

faces at the expense of individuation. Neuroimaging studies report findings supporting both theories, in areas reflecting visual and socio-affective processing, respectively. To assess perceptual and outgroup categorization contributions to the ORE, a promising - yet overlooked - solution is comparing neural responses to different other-"races". We present a label-based systematic review of neuroimaging studies comparing activation in response to other "races" (African, Caucasian, or Asian) with activation to the same "race" of participants. Hypothetically, while common activations would reflect general aspects of other-"race" perception, differential ones would represent effects of "race"-specific visual appearance. We find that faces of different other-"races" consistently engage occipito-temporal areas, presumably due to higher demand on the visual system. Other frequently reported areas (midcingulate gyrus, precuneus, declive and caudate nucleus) are related to categorization, theory of mind and behavioral regulation. Despite little support specifically for reduced motivation in OR face processing, our results suggest the importance of both perceptual expertise and social categorization. Importantly, we also identify areas preferentially responding to specific OR faces, thus reflecting effects of visual appearance.

Source effects on the perceived truth of simulated social media postings

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Due to the problem of misinformation and disinformation in social media, the question arises a) which sources of information are perceived as credible and b) whether perceived source credibility is taken into account when assessing a statement's truth status. Recent work by Nadarevic et al. (2020) demonstrated effects of source expertise (expert sources vs. lay sources) and source trustworthiness (real, trustworthy news sources vs. faked news sources) on participants' truth judgments. However, the experiments lacked a direct comparison of lay sources versus faked news sources. The current work addressed this issue by means of simulated social media postings. One third of the postings appeared with names and pictures of lay people, one third appeared with names and logos of faked news sources, and one third appeared with the label "unknown source". Not only did participants rate the credibility of faked news sources higher than that of lay people, but they also rated the postings as more likely to be true when presented with faked news sources than when presented with lay sources or without sources. This result is particularly noteworthy because fake news is spread, among other things, by sources that imitate reputable news sources in their appearance.

Spatial attentional orienting in multisensory environments: An EEG study

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Despite a growing body of evidence that illustrates the multitude of cross-modal in-

teractions that can affect sensory-specific processes in a spatially specific manner, our understanding of how the brain allocates spatial attention in multisensory environments remains elusive. In this pre-registered study (https://osf.io/vh38g), we investigated the interplay and the temporal dynamics of unisensory attention mechanisms in an audiovisual search paradigm. Subjects ($N = 36$) were presented with two concurrent, lateralized sounds. In three separate task blocks, the auditory speech stimuli were presented together with congruent visual speech (Avc), unspecific visual speech (Avu), or without visual speech (Aonly). Subjects were asked to determine the lateral position (left vs. right) of a pre-defined target word. While accuracy in the task was close to ceiling in all conditions, response times showed a typical multisensory facilitation effect, with fastest responses for Avc stimuli compared to Avu and Aonly. Responses were slowest for Aonly stimulation. In addition to behavioral responses, we recorded the EEG. Contrary to our pre-registered hypotheses, we found no modulation of N2ac or N2pc amplitude and onset latency between conditions. However, a late sustained contralateral negativity emerges over anterior (i.e. SACN) and posterior sites (i.e. SPCN) following the N2ac and N2pc, respectively. Both SACN and SPCN were most pronounced in the Avu condition (compared to Avc), suggesting that conflicting auditory and visual information requires sustained processing (in the focus of attention). The results shed light on the interplay of audition and vision when allocating attention in multisensory environments.

Strategy change in a stroop task with high and low control demands

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In many situations multiple correlated features can be used to select a response (e.g. color or position of traffic light, red is always at top position). In an online experiment ($N = 147$), we combined a variant of the Stroop task with the option for a covariaton-based shortcut to investigate whether adopting a shortcut strategy after practice depends on the extent to which the initially instructed strategy demands controlled processing. Participants were instructed to press an upper key [Q] whenever word color was blue or yellow and press a lower key [Y] in case of a green or brown word. The color words were presented at a high vs. low position on the screen. During practice, two of the colors (blue and green; measurement colors) were 100% congruent with the word. Importantly, their screen position was assigned in a consistent manner (blue always top; green always bottom) such that participants could use color, word and/or position to select a response. The likelihood of strategy change was targeted by a between-groups variation of color-word-congruency and position-consistency (in the inducer colors, yellow and brown). In the low-control demand condition, brown and yellow where 100% congruent and their position was 100% correlated with the required response. In contrast, in the two high control demand conditions only 50% of the trials were color-word congruent. One still allowed for a position-shortcut, whereas the other did not. Error rates and RTs in a transfer block without feature covariation and congruency suggest that the key factor determining strategy change was whether the position shortcut could be applied to all colors.

Stressreduktion und Achtsamkeitstraining

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Sportliche Betätigung kann therapeutische/präventive Zwecke fördern, z.B. zur Erhöhung der psychologischen Resilienz. Wir untersuchten experimentell die Wirksamkeit und Spezifität von Achtsamkeitsübungen zur Stressreduktion, Steigerung des Wohlbefindens und der Achtsamkeit. Am Interventionsprogramm mit Achtsamkeitsübungen und Wartekontrollgruppe (Prä-, Post-Design) nahmen 95 Probanden teil ($M_{\text{Alter}} = 36.4J.$; 27 m.). Reitsport-Probanden wurden randomisiert in zwei Interventionsgruppen (IG) aufgeteilt (je $n = 22$; Kontrollgruppe, KG, $n = 51$). Es wurden das aktuelle Wohlbefinden, Achtsamkeit und Stresserleben mit 3 etablierten Skalen erfasst. Die IG führten 7 Tage selbstbezogene Achtsamkeitsübungen (AG) oder pferdegestützte Achtsamkeitsübungen durch (PG). Zweifaktorielle ANOVAs (Zeitpunkt [2] $\times$ Gruppe [3]; AVs: Wohlbefinden, Stress & Achtsamkeit) zeigten keine Interaktionseffekte (alle $F < 1$, n.s.). Geplante Post-hoc-Vergleiche je Gruppe ergaben eine Stressreduktion für die PG ($t(21) = -3.38$, $p < .05$), eine Steigerung der Achtsamkeit für die AG ($t(21) = 2.28$, $p < .05$) & tendenzielle Achtsamkeitssteigerungen für die PG ($t(21) = 1.93$, $p = .068$) und Stressreduktion für die AG ($t(21) = -2.0$, $p = .058$); keine signifikanten Veränderung in KG. Auch zeigte nur die PG Verbesserungen in allen abhängigen Variablen im Vergleich mit der KG in der Post-Messung (alle $t > 2.15$, alle $p < .05$). Wie erwartet, zeigen nur die IG Veränderungen (Stresserleben & Achtsamkeit); Wohlbefinden zeigt keine Veränderung. Die Daten legen eine spezifische Stressreduktion durch tiergestützte Achtsamkeitsübungen nahe (AG nur tendenziell signifikant); auch zeigt die PG vor der Studie ein höheres Achtsamkeitserleben als die KG. Die Befunde zeigen ein gesundheitsförderliches Potenzial (tiergestützter) Achtsamkeitsübungen.

Suppressing the mnemonic effect of animacy

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Animate words are consistently remembered better than inanimate words. This animacy effect hints at an evolutionary adaptation of our memory system, prioritizing information crucial for survival. Yet there is little insight into the proximate mechanisms leading to the effect. Previous research discusses attention, threat and arousal among other suggestions. One relevant aspect to gain a better understanding might be the amount of control participants have over the effect. In two self-paced learning experiments, the participants were informed and instructed to prioritize either animate or inanimate words and allocate their time and attention accordingly (without neglecting the other). The first experiment consists of an sequential learning task, while the second experiment implements a less restricted and more controllable learning task. The results are discussed regarding the effect of focused attention on animate and non-animate words.

Syntactic complexity as cue for judging truth

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Syntactic Complexity as a Cue for Judging Truth The illusory truth effect describes the phenomena that repeated statements are judged as true more often than novel ones. The fluency theory explains this finding by assuming that easily processed statements are judged as truer than disfluently processed ones. In the context of fake news, this offers an explanation for misjudging truth as well. Often, fake news communicate complex content in a simple way, for instance by using simple syntax. Since the effects of syntactic complexity on truth judgements have not yet been investigated, we conducted two preregistered online studies. Experiment 1 extended the classical truth-effect paradigm by manipulating syntactic complexity as a within-subjects factor (simple vs. complex). Besides replicating the repetition-based truth effect, we did not find a significant main effect of syntactic complexity on truth judgements. Assuming that this might have been due to the low salience of the complexity manipulation, Experiment 2 increased the salience of syntactic complexity by explicitly letting participants rate the syntactic complexity of statements during the exposure phase. In contrast to the fluency account, we found that complex statements were judged as true more often than simple ones. This suggests that the feeling of fluency and the perception of syntactic complexity are used as separate cues for truth judgments.

Tactile sensitivity and bias in pathological illness anxiety

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Body perception in illness anxiety disorder might be biased in the way that somatic signals are overreported. In the somatic signal detection task (SSDT), participants classify weak tactile stimuli as present or absent. Performance gives information on over- or underreporting of stimuli regardless of tactile sensitivity. The influence of illness-related cognitive schemata has not yet been studied using this task in patients with illness anxiety. Participants with illness anxiety ($N = 44$) and healthy controls ($N = 40$) underwent two versions of the SSDT in randomized order. In the original version, tactile and auxiliary LED stimuli were each presented in half of the trials. In the adapted version, illness words were presented instead of LED stimuli and compared to neutral words. Results showed 1) higher sensitivity and a more liberal response bias in LED vs. no LED trials, but 2) no differences in sensitivity and response bias between word types. 3) An interaction effect showed group differences regarding sensitivity: The illness anxiety group showed a more pronounced increase of sensitivity from no LED to LED trials, and a decrease of sensitivity from neutral to illness word trials as compared to the control group. The increase in sensitivity from no LED to LED trials in the illness anxiety group indicates increased multisensory integration, while the decrease of sensitivity in illness compared to neutral words implies greater distraction due to illness related schemata. Overall, low sensitivity in the adapted SSDT showed that attentional resources were exhausted by

processing word stimuli. This effect might have carried over to the original SSDT when presented in this order, thus compromising group effects regarding sensitivity and bias in the original SSDT.

Technology-based support for unaccompanied minor refugees: An empirical investigation of influencing factors on the evaluation of an online peer counseling concept

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Many unaccompanied minors have migrated to Germany in the past years. A presumably high proportion suffers from psychological stress caused by traumatic experiences before and/or during the flight. The traumas often remain unrecognized which is why innovative, low-threshold ways of support should be created. To improve the deficient care situation of refugee minors, an easily accessible smartphone app is being developed. The app offers, inter alia, exchange opportunities with peers who also have a migration background via an online (video) chat. Since peer counseling concepts are generally discussed controversially and underage refugees are a particularly sensitive group of people, an evaluative online survey was conducted. Professionals were asked to evaluate peer counseling concepts in general and the proposed concept in particular. Thirty-four individuals (29 female, 5 male; age in years: $M = 36.9$, $SD = 10.8$) who are either volunteers or full-time refugee workers participated in the survey. The descriptive values show a generally positive evaluation of the proposed peer counseling concept and a high interest in having the own organization participate. The personal interest to participate however was rather low, likely because most of the respondents do not have a refugee background. A hierarchical regression analysis revealed a significant influence of the participants' age and gender, but not their education, status, length of working in the psychosocial sector, evaluation of peer counseling concepts in general, and privacy risk beliefs. Men evaluated the concept more positively than women and with increasing age the concept was evaluated more negative. The age effect may be explainable a by an increase in experience and thus stronger focus on the critical aspects.

Tell me what'd I say: Verbal fluency as a measure of creative language use

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Creative language production is traditionally characterized by a high number of unusual and varied responses. Verbal fluency tests, where a speaker has to generate as many exemplars of a category as possible, allow to quantify different aspects of creative speech. Our goal was to explore how the performance in verbal fluency tasks depends on creativity and vocabulary size. One hundred participants performed a verbal fluency task with 24 semantic categories of varying difficulty (e.g. easy: "animals", medium: "trees",

difficult: "precious stones"). The number of correct responses, the frequency of each answer (over all participants) and the position of each answer (within participants) were analysed. Verbal fluency results were then correlated with a creativity (Alternative Uses) and a vocabulary task (MWT-B). For many categories, more frequent answers were more likely to be mentioned earlier (e.g. "dog, cat, mouse" for "animals"). However, there were also categories with highly unpredictable orders of answers (e.g. the categories "hobbies", "vessels", "dances"). Performance on these categories was positively correlated with the creativity task, but uncorrelated with the vocabulary task. Meanwhile, vocabulary compared to creativity was most important for the difficult categories. The results demonstrate how verbal fluency tasks measure different aspects of language, depending on the category used. Often, categories like "animals" are used to measure divergent thinking or executive functions, and the number of correct answers are the default metric. The present work suggests that in order to derive richer measures of language production, it might be interesting to use categories that are inherently more unpredictable and to analyse the participants' order of answers.

Testing a parallel coherence-based process of preference updating about options and information distortion when information is presented sequentially

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People distort information about options in the direction of their emerging preference when information about options is presented sequentially one at a time (Russo, 2015). The robust finding is that information about the preferred option is evaluated more positively whereas information about the non-preferred option is evaluated more negatively. In the standard statistical analysis of information distortion (ID) researchers have typically related the extent of ID on currently presented information to the strength of participants' previously indicated preference for decision options. We argue that this analysis implies a serial cognitive process of ID. This, however, does not align well with the assumption of a parallel cognitive process that is at the heart of the coherence-based model that has been proposed for explaining ID (DeKay, 2014). The model implies that a change of preferences for options runs in parallel to the evaluation of current information, and that both processes affect each other. In a study with 210 participants, we tested the implications of such a parallel process on ID for decisions between two options in health and consumer-related domains. We find for the current round of information presentation that (1) a positive change in preferences leads to stronger ID (push effect), (2) a negative change in preferences leads to weaker ID (pull effect), (3) preference reversals change the direction of ID (reversal effect), (4) and information in accordance with the current preference is distorted more strongly and processed faster (coherence effects). Implications of the results for the literature are discussed such as the benefit of theory informing the statistical analysis for advancing our understanding of ID.

Testing sampling-based models of probability judgments with an event ranking task

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People's probability judgments often appear to be probabilistically incoherent. The most prominent example of this is the conjunction fallacy (Kahneman & Tversky, 1983). Recently, a sampling-based model, the Probability Theory plus Noise (PT+N) model (Costello & Watts, 2014; Howe & Costello, 2020), has been proposed to account for biased probability judgments. One limitation with testing this model is that it has only been investigated in the probability estimation tasks. In the current study, a ranking task is used to study people's probability judgments, and more importantly, to test the PT+N model. In the ranking task, participants are asked to provide a ranking for the event set consisting of four events, A, not-A, B, and not-B, in terms of their subjective probabilities. We formally derive the predictions for rankings from the PT+N model. Our predictions suggest that (1) people will sometimes violate the complement rule by providing logically impossible rankings, and (2) specific qualitative patterns should appear in rankings. In an online experiment, we asked participants ($N = 177$) to rank 12 different event sets and found evidence for rankings in line with the predictions from the PT+N model.

The action-sentence compatibility effect (ACE) a benchmark finding for embodiment – a meta-analysis

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The embodied account of language comprehension has been one of the most influential theoretical developments in the recent decades addressing the question how humans comprehend and represent language. It emphasizes a tight interconnection between language and the sensorimotor system. To examine its assumptions, many studies have made use of behavioral paradigms involving basic compatibility effects. The action–sentence compatibility effect (ACE) is one of the most influential of these action compatibility effects and is widely cited evidence for the assumptions of the embodied account of language comprehension. However, recently there have been difficulties to extend or even to reliably replicate the ACE (Papesh, 2015). The conflicting findings concerning the ACE led to the discussion whether the ACE is indeed a reliable effect. To address the question of the reliability of the ACE, we conducted a meta-analysis with the aim to compile previously published ACE studies with a study design similar to the original one (Glenberg & Kaschak, 2002) in order to estimate the size of the ACE. Since previous ACE literature has shown that timing of the motor response in the ACE paradigm affects the magnitude of the ACE, we decided to include the factor "Delay of response movement" in our meta-analysis (e.g., Borreggine & Kaschak, 2006). The meta-analytic estimate of the overall mean effect size revealed a small but significant effect for the standard ACE ($d = .129$, $p = .007$). Furthermore, the task-parameter Delay occurred as a factor of interest in

whether the ACE appears with positive or negative effect direction. This meta-analysis further assessed for potential publication bias and suggests that there is bias in the ACE literature.

The dopamine D2 receptor gene and semantic priming

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The magnitude of masked and unmasked priming effects vary considerably across individuals. Interindividual differences in priming at least partly depend on prefrontal functioning and are associated with working memory processes. Striatal dopamine activity, which is coupled with the prefrontal dopamine system, has been shown to be associated with working memory capacity and impulsivity. Dopamine exerts its effect by binding to various dopamine receptors, for instance, the dopamine D2 receptor (D2R), predominantly expressed in the striatum. The gene coding for the D2R (DRD2) comprises several polymorphisms. We investigated the association between a cumulative genetic score (CGS) comprising six DRD2 polymorphisms and semantic priming. We analyzed genetic and behavioral data from a masked and an unmasked priming paradigm of $N = 151$ healthy participants. We found a significant effect of the DRD2 CGS on reaction times (RT) of the masked semantic priming paradigm: Individuals carrying a higher number of genetic variants impairing DRD2 density and dopamine binding potential showed reduced RT priming. These results are in line with findings of exaggerated priming in patients suffering from schizophrenia who exhibited a hyperactive dopaminergic transmission at the D2R. The D2R could be an important factor contributing to the interindividual variability of priming effects.

The effect of temporal attention on integration and retrieval of distractor-response bindings

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Binding theories of action control assume that stimulus and response features of a single episode are stored in short-term episodic traces – event files. Repetition of any of the features results in an automatic retrieval of the file. Along with relevant stimuli, event files also contain features of irrelevant stimuli (distractors). Repeating a distractor automatically retrieves the event file, facilitating responding if the response must be repeated, but causing interference when a different response is required. The present study aims to test the effect of temporal attention on distractor-response binding effects. Orienting attention to specific points in time enhances the processing of stimuli occurring at that time point. In the present study, temporal attention was manipulated between subjects by varying the predictability of the stimulus onset. In the predictable condition, the stimulus always occurred after a fixed interval. In the unpredictable condition, the stimulus occurred after a random interval drawn from a random exponential distribution with the same mean as the predictable condition. In Experiment 1, the interval between

the response to the prime and the onset of the probe stimulus was varied, targeting the retrieval process. Results indicated only a trend towards an effect of temporal attention on distractor-response bindings. In Experiment 2, the interval between the fixation cross indicating the start of a trial and the prime stimulus was varied, targeting the integration process. Additionally, in Experiment 2, the RSI between prime response and probe stimulus was varied. Preliminary results indicate that predictability of the prime stimulus may interact with RSI indicating that the decay effects are modulated by predictability of the prime stimulus.

The effect of the Ebbinghaus illusion on temporal reproduction: Evidence for higher level interference between subjective size and temporal processing

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Previous studies have shown that the size of a stimulus affects its perceived duration, and this is not only the case for physical size but also for subjective size. In the present study, we tested whether the effect of the Ebbinghaus illusion on perceived duration can be explained by an altered time perception during encoding of the stimulus or by higher level interference. In our experiment, participants had to reproduce target intervals of 400, 600, or 800ms by terminating a reproduction stimulus. The Ebbinghaus illusion was applied either during the target interval or during the reproduction phase. If the Ebbinghaus illusion affects time perception during encoding of the stimulus, subjective size should have opposite effects on temporal reproductions depending on when the Ebbinghaus illusion is presented. That is, larger subjective size should lead to longer reproductions when the Ebbinghaus illusion is presented during the target interval and to shorter reproductions when it is shown during the reproduction phase. In contrast to this prediction, results showed the same effect of subjective size irrespective of when the Ebbinghaus illusion was presented. This result pattern suggests a higher level interference between subjective size and temporal processing.

The impact of analytic choices in dense sampling analysis pipelines

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In the last decade, the dense sampling technique, a psychophysical approach to test rhythmicities in perceptual and cognitive functions, has gained in popularity. Typically, a reset event such as a visual cue is presented at the beginning of each trial to reset the rhythm of interest, thereby aligning oscillations across trials. This enables the experimenter to sample behavioral performance at different phases of the oscillation by presenting target stimuli at various intervals after the reset event. Thus, the time course of behavioral performance is expected to reflect the rhythmicity of the tested perceptual function. However, testing behavioral data for rhythmicities requires numerous decisions

about various signal processing and spectral analysis parameters, amounting to a virtually infinite number of potential plausible analysis pipelines. Unfortunately, while the field of dense sampling shows great variability of analytic decisions, the impact of these choices on results is unknown. Therefore, we conducted a simulation study to compare common analysis pipelines found in the literature. To this end, we created surrogate data mimicking prototypical dense sampling studies by simulating single trial data with or without an underlying oscillation of varying amplitude. Using these data, we tested the performance of various analysis pipelines, i.e. combinations of preprocessing, frequency decomposition and multiple comparison correction methods. Critically, we found that pipelines differed in their signal detection properties as measured by the sensitivity index d'. For example, second-order detrending was the most robust detrending method for all simulated trends. Based on these findings, we provide best practice recommendations for future dense sampling studies.

The impact of intention, outcome frequency, and outcome valence on illusions of control

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Humans experience themselves as causing events in the outside world when these events follow their actions in a contingent and contiguous manner. Sometimes, they even experience control over the consequences of action when actual control (contingency) is missing. One such illusion of control is the density bias: Actions are often judged to be more effective in producing non-contingent outcomes when the overall frequency of the outcome is high rather than low. Blanco and Matute (2014) showed that the density bias depends on participants' goal. They observed a typical density bias (i.e., more subjective control for frequent than for rare outcomes) only when participants were instructed to learn to produce a desired outcome (a light associated with a reward) by pressing a key. The density bias is reversed when participants were instructed to prevent light events that were associated with punishment. In our experiment, we extended the Blanco and Matute (2014) study in several regards. In order to investigate whether the density bias is modulated by desirability of outcomes in general, we substituted gain and loss of points associated with switching on a light bulb with traffic lights that could either switch to red or to green. Moreover, we orthogonally varied prevent/produce instructions and outcome valence to explore the relative contributions of (instructed) intention and outcome valence to the density bias. Results will be discussed with respect to sense of agency in general and contingency learning in particular.

The impact of internet use disorder and smartphone addiction on acute mental fatigue: An fMRI study

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Introduction: Growing literature indicates that Internet use disorder (IUD) and smartphone addiction (SPA) are associated with breakdown of different functional brain networks. According to recent behavioural studies' results, the extent of IUD has an impact on acute mental fatigue. The neural background of mental fatigue in IUD and SPA is not well understood, therefore investigation of the phenomenon with functional Magnetic Resonance Imaging (fMRI) is indispensable in these two conditions. Methods: Psychophysical Vigilance Task (PVT) was used to induce acute mental fatigue during fMRI. Blood-oxygen-level-dependent analysis was implemented to investigate mental fatigue induced brain activation changes in IUD and SPA. Self-reported questionnaires were used to assess IUD, SPA, and the subjective mental fatigue. Reaction times during PVT were measured the get an objective data of subjects' acute mental fatigue. Results: Positive associations were found between IUD, SPA and the extent of perceived mental strain, and subjective feeling of fatigue, during task implementation. The extent of SPA was in positive association with the objective level of mental fatigue. Brain regions related to default mode network (DMN) (left precuneus) and executive control network (ECN) (left frontal pole) showed reduced activation during the PVT, which correlated positively with the extent of IUD and SPA. Discussion: Our findings highlight the impact of IUD and SPA on acute mental fatigue, since positive associations were found between task induced brain activation changes and the extent of IUD and SPA. Moreover, according to previous results, we confirmed the altered functioning of brain areas connected to DMN and ECN in these two conditions.

The impact of music related autobiographic memory's valence on mood, arousal and focus of attention

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Music can evoke emotions through various processes (Juslin & Laukka, 2004). One way is that music related autobiographical memories (MEAMs, Krumhansl & Zupnick, 2013) influence mood and arousal according to the memory's valence. MEAMs could also influence cognitive processes. As positive mood widens the attentional focus (Fredrickson, 2013), this might result from mood changes following MEAMs. Hypothesis 1: MEAMs influence mood: Mood after remembering is influenced by the valence of MEAMs, independent of pre-test mood. Hypothesis 2: Memorizing positive MEAMs widens the attentional focus. Using an online experimental setting, 226 participants (Age: $M = 54.4$, $SD = 12.78$) were randomly distributed to three groups. After assessing pre-test mood, participants were instructed to write down either a positive, negative, or neutral music-related memory. Afterwards, post-test mood was assessed. Attentional focus was measured using the cross-task to assess inattentional blindness (Mack & Rock, 1998). Participants of all groups had comparable mood at baseline. After memorizing the music-related event, participants in the positive group reported of higher positive mood, than those in the negative group, $F(2, 223) = 6.17$, $p < .01$, $\eta^2 = .05$. MEAM's valence did not influence arousal, $F(2, 223) = 1.63$, $p > .05$, $\eta^2 = .01$. Only 3.5% of the participants

recognized the unexpected stimulus, the valence of MEAMs did not affect attentional focus, $\chi^2(2, N = 226) = .18$, $p > .05$. The valence of MEAMs has a clear influence on post-test mood. This does not appear to affect one's attentional focus which might be due to the low number of participants who recognized the unexpected stimulus altogether. The results are discussed regarding their relevance for emotion regulation processes.

The impact of sensory-processing sensitivity on visual word processing

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The personality trait sensory-processing sensitivity (SPS) is marked by a greater sensitivity and responsiveness to internal and external stimuli. The trait's characteristics among others are a deeper and more thorough cognitive processing of stimuli and a sense of subtle details (Aron et al., 2005; Aron, 2020). Prior studies have shown that SPS comes along with neural correlates in response to subtle changes in visual scenes (Jagiellowicz et al., 2011). In order to examine if and how these properties influence also visual word processing and the language system, a lexical decision task was conducted on 116 subjects. Stimuli varied in lexical frequency and lexicality and were counterbalanced by multiple factors like neighbourhood density or length. SPS was measures by the German version of the Highly Sensitive Person Scale (Konrad & Herzberg, 2017). We found a significant interaction between lexicality and SPS showing longer latencies for pseudowords according to high SPS, while SPS had no effect on reaction times for words. The overall findings suggest an impact of SPS on language processing, potentially caused by the depth of processing and a "pause-to-stop"-reaction induced by the strangeness of the pseudowords. Stimuli, with which subjects are not familiar, seem to lead to more thorough processing and longer latencies in people scoring high in SPS. To further examine how the language processing system is affected by SPS, a second experiment was conducted. A masked semantic categorization task along with a masked lexical decision task was constructed, with primes consisting of related and unrelated words and congruent and incongruent pseudowords to test for the locus of the effect in the language system. Data collection is complete, results will be on hand by January.

The importance of anchor objects for scene affordance

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The world we live in is not one we perceive passively; instead, we actively interact with our surroundings, performing actions on and with objects. Research shows that anchor objects play an important role in visual search and scene understanding (Võ, 2021), but the influence of anchors on the perceived functionality of a scene remains unexplored. In the current study, we investigated the influence that different action related and unrelated anchors have on the perception of scene affordances (i.e., the action possibilities in a scene). Participants rated the fit between an action (e.g., "brushing teeth") and an indoor scene

(e.g., an image of a bathroom) in which either an action related (e.g., a sink) or an action unrelated anchor (e.g., a shower) was masked. Compared to the control condition, in which a random non-anchor object (e.g., a window) was masked, participants rated the scenes lacking the action related anchor as less fitting to the presented action. A weaker, but robust effect was found when the action unrelated anchor was masked, demonstrating that the perceived functionality of a scene is strongly linked to the presence of specific anchors. The second experiment included a speeded two-alternative forced-choice task to measure scene perception and affordance more implicitly. Participants reacted slower and less accurate when the action related anchor was masked. Here, the masking of action unrelated anchors resulted in similar effects as the masking of random objects. We conclude that anchors contribute to the holistic understanding of scene affordances, but that action related anchors are of most importance. In an upcoming, third experiment, we seek to replicate these results while additionally manipulating presentation times.

The influence of embodiment effects of mental rotation stimuli on postural stability

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Goal of the study was to investigate the effect of different embodied stimuli in mental rotation tasks (MRT) on postural stability. As it is already known that embodied MRTs lead to less body sway than non-embodied MRTs, we conducted two separate experiments to systematically investigate the influence of embodiment in egocentric and object-based MRTs on postural stability. We hypothesized that using posture-related body parts as stimuli in MRTs, would induce a decrease of postural sway compared to body parts which are not essential to postural control. Both experiments used the same stimulus pictures for the MRTs (whole-body, hand, foot) and a fixation cross as a control condition. Postural stability was measured by Center-of-Pressure course over time while standing in a both-legged narrow stance on a force plate. Experiment 1 ($N = 46$) focused on egocentric MRTs and revealed significant differences between stimuli. However, the hypothesis has to be rejected. Hand and foot stimuli tended to cause more body sway than whole-body figures. Additionally, hand and foot stimuli showed an increasing body sway for higher rotation angles of the MRTs. In experiment 2 ($N = 109$) object-based MRTs were examined. Different stimuli did not evoke different levels of body sway but higher rotation angles led to higher body sway. The results of both experiments suggest a differential impact of type of mental rotation (egocentric vs. object-based) on postural stability and for egocentric MRTs also a different impact of embodied stimuli. Nevertheless, the supposed effects of embodiment are critically discussed against the background of task difficulty. In general, these findings contribute to a better understanding of the relationship between mental rotation and basic motor processes.

The influence of object speed on illusory crescents and perceived bouncing/streaming

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In visually ambiguous situations, cross-modal information such as tones influence the way how observers establish object correspondence. A good experimental paradigm mimicking such visual ambiguity is the bouncing/streaming display. In this display, two identical discs move horizontally toward each other, overlap in the center of the screen, and then move apart again. Object correspondence can be resolved either as two discs bouncing off or as two discs streaming past each other. While the visual display is typically perceived as streaming, a brief tone that coincides with the visual overlap typically induces the perception of bouncing (auditory-induced bouncing). Besides this, a brief tone also reduces the amount of perceived overlap between the moving discs (auditory-induced illusory crescent). In this study, we probe an attentional explanation for how auditory-induced bouncing and auditory-induced illusory crescents are related. We propose that a tone-induced distraction of attention induces the illusory crescents which in return might elicit an increase in perceived bouncing. To test this explanation, we manipulated the speed of the moving objects measuring auditory-induced bouncing as well as auditory-induced illusory crescents within the same participants. Object speed hardly affected perceived bouncing but increased illusory crescents. However, the speed manipulation did not alter the effect of the coinciding tones in both illusions. This rules out the attentional distraction hypothesis. Nevertheless, we observed correlations between the magnitude of both illusions within each level of object speed. This suggests that both illusions in general are related although the exact origin remains unresolved.

The influence of physical salience depends on goal-driven attentional guidance

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Physical salience and search goals are the main factors guiding attention during visual search. However, salience alone is typically not sufficient to capture attention. For example, if cues do not match the current searched-for target feature, they do not capture attention despite being salient. However, it has recently been argued that the usually used nonmatching cues are just not salient enough to capture attention, and more salient cues would capture attention even if they do not match the searched-for feature. We investigated this claim by varying the physical salience of matching and nonmatching cues in a contingent capture protocol. Participants searched for a target color amongst four colored stimuli (feature search), while a singleton cue with a target-matching or nonmatching color preceded the target at the same position (valid trials) or a different position (invalid trials). Here, slower reaction times in invalid trials compared to valid trials (i.e., the validity effect) would indicate attentional capture by the cue. To vary the cue's salience (low vs. high), we presented the cue block-wise amongst three or seven color

homogeneous nonsingleton stimuli. Nonmatching cues did not elicit significant validity effects, regardless of their salience. In contrast, matching cues elicited significant validity effects that were stronger for highly than lowly salient cues. The results showed that nonmatching cues do not capture attention even if they are highly salient. However, the physical salience of matching cues influenced attentional capture, showing that bottom-up salience's influence depends on top-down guidance.

The influence of prior experience on object correspondence

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The objects around us move and they can disappear behind other objects or change their appearance, e.g, if the lighting conditions change. Nevertheless, the visual system is able to integrate this new spatio-temporal and feature information into the existing object representations and thus to establish correspondence. It is unclear, however, how this information is weighted during the correspondence process. Here, we investigated if this weighting can be influenced by prior experience. We used an ambiguous apparent motion display, the Ternus display, in which three elements can be perceived as either moving independently (element motion) or together as a group (group motion). Which percept is seen depends on how correspondence has been resolved. To manipulate prior experience, we presented in a first phase different types of Ternus displays. For one group of participants correspondence could be based on spatio-temporal information as the interstimulus interval (ISI) between the Ternus elements varied. For the other group correspondence could be based on feature information, as the Ternus elements were presented in different colors, compatible with group or element motion. In a second phase we then showed both groups of participants the same Ternus displays, in which correspondence could be based on both factors. The results showed that the ISI had a stronger effect for the group that was trained on a variable ISI compared to a control group that only participated in the second phase, suggesting that prior experience can influence correspondence. We also looked at the stability of this prior experience effect by presenting the second phase 24h after the first phase and found that the effect was decreased, but did not disappear completely.

The influence of shame and guilt on event-based prospective memory

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Event-based prospective memory (PM) refers to remembering to carry out a previously planned action when a specific event occurs in the future. PM consists of two components: the prospective component (remembering that something has to be done) and the retrospective component (remembering what has to be done and when). As basic emotions (e.g., sadness) can influence PM we were interested in investigating the effects of complex emotions on PM. In previous experiments, we found that induced shame led

to impairments in the prospective component. Another and similar emotion is guilt. The goal of the current experiment was to investigate the influence of both emotions. We manipulated the mood of 162 participants (shame vs. guilt vs. neutral) during a standard event-based PM task. Participants had to press a special key whenever they encountered one of several previously studied target words during an ongoing color-matching task. Emotions were induced via an autobiographical writing procedure. To obtain unconfounded estimates for the prospective and retrospective components, we used the multinomial processing-tree model of event-based PM (Smith & Bayen, 2004). Both complex emotions, shame and guilt, led to impairments in the prospective component in comparison to the neutral group. There was no significant difference between both complex emotions. Thus, it seems that shame and guilt have similar effects on PM.

The intrinsic cognitive load of the lesson planning task: Varying element interactivity and previous knowledge in an experiment on student teachers' lesson planning decisions

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During their first attempts in lesson planning student teachers plan linearly instead of dynamically, incoherently and without proper consideration of students' preconditions. These problems may be explained by the interplay of the lesson planning task's high intrinsic cognitive load, the limited capacity of human working memory and novices' lack of lesson planning routines: The intrinsic cognitive load of a task is dependent on the number of task elements, their interrelations (element interactivity), and previous knowledge stored in long-term memory. During lesson planning, a large number of interrelated elements (e.g., objectives, content, methods, materials) has to be considered that may overload working memory. At the same time, student teachers as novices do not have routines they could retrieve to circumvent the working memory capacity threshold. These assumptions have not been tested yet. To build evidence for the explanation of novices' lesson planning problems presented above, an experiment is designed in which the intrinsic load of the planning task (within, IV1) and the previous knowledge on planning principles (between, IV2) is modified. The experiment is administered online. Participating student teachers are asked to work on closed vignettes of planning situations in which few, several or many planning elements must be considered. After each vignette, intrinsic load is self-assessed. This assessment serves as one of three dependent variables besides performance and answer time. While there is some evidence for the generic nature of the vignettes from pretests, closed answer options and the self-assessment of the intrinsic load are limitations of the study. The proper data analysis needs further discussion as well as the manipulation of previous knowledge.

The nature of associations between physical stimulus size and left-right response codes

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In two-choice response tasks, participants respond faster and more accurate with the left hand to a small stimulus and with the right hand to a large stimulus as compared to the reverse assignment. This compatibility effect suggests the existence of associations between cognitive codes of physical stimulus size and cognitive codes of left/right responses. Here, we explore the nature of associations between stimulus-size codes and left/right response codes by using more levels of stimulus size than in our previous studies. For example, the strengths of the associations between stimulus-size codes and response codes might either change gradually when stimulus size changes, or the strength of associations might change in a more discrete fashion (i.e., associations switch at a particular size level). In Experiment 1, participants responded to stimulus color with a left/right keypress, and physical stimulus size had ten levels with 5mm steps. Results showed congruency effects for the smallest and the largest stimulus size only. In Experiment 2, physical stimulus size had six levels with 10mm steps. Results showed (similar) congruency effects for the smallest and some intermediate stimulus-size levels. In sum, the results point towards a discrete, or categorical, relationship between cognitive codes of stimulus size and left/right response codes. This pattern of results is consistent with an account of the correspondence effect in terms of the polarity-correspondence principle.

The role of gain and loss incentives on time-based prospective memory

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Prospective memory (PM) refers to carrying out intended actions in the future. PM tasks can be event-based (e.g., remembering to buy medication when you pass a pharmacy) or time-based (e.g., remembering to take medication at 7pm). In studies on event-based PM, younger adults often show higher PM than older adults. However, motivation can be an important moderator of age-related differences in PM performance: Whereas younger adults tend to be more motivated by gains, older adults focus more on preventing losses. Consistent with this, Horn and Freund (2021) found larger age-related differences in event-based PM in a gain condition than a loss condition. However, the effects of gain/loss incentives on time-based PM are currently unknown. Since time-based PM places greater demands on monitoring the environment than event-based PM, motivational effects could be even more pronounced in time-based tasks. In the present research, participants performed a computerized ongoing task and received an additional PM task, to be performed in regular time intervals. Moreover, participants could request a virtual clock during the tasks. Gain and loss conditions were manipulated by instructing participants that correct PM responses during target times lead to small monetary gains (gain-frame) or to losses from an initial endowment (loss-frame) if PM target times are missed. We anticipate

higher PM performance in younger than older adults and an Age × Incentive interaction. Moreover, clock checking should correlate positively with PM performance. Our findings will add to the understanding of how motivational framing can affect PM across the adult lifespan.

The role of guided affective episodic foresight for proactive behavior in 5-year olds

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Episodic future thinking (EFT) denotes humans' ability to mentally project one's self into a specific future situation. It has been suggested that EFT has tremendous adaptive value, e.g. by facilitating the preparation for challenges and opportunities that will only occur in the future (proactive behavior). Some evidence in adults supports this assumption and suggests that anticipated affect plays a crucial role for this relationship (Kotabe et al., 2019). Respective research with children is still missing. We want to close this gap by investigating whether guided EFT about anticipated affect fosters proactive behavior in 5-year old children. We aim to examine a total of $N = 90$ children (age in months: $60 - 71$) in an interactive online experiment until March 2022. Children are randomly assigned to one of three EFT conditions (no guided EFT, guided EFT about positive affect, guided EFT about negative affect). Children visit two rooms. In the first room, the experimenter presents three games. The experimenter announces that children will come back to the room later and that they will have the opportunity to win stickers when mastering a test in one of the games then. In a second room, EFT about the upcoming test is manipulated depending on condition. Afterwards, children have the opportunity to play one of the three games including the test game. We hypothesize that children in both guided EFT conditions choose the test game more often in preparation for the test compared to children in the control group (proactive behavior). In addition, we explore possible differences between the guided EFT conditions about positive vs. negative affect. Data collection is still ongoing and we will present preliminary results for a subsample.

The role of implicit achievement motivation in decision making under known risk

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Motivational dispositions are assumed to influence people's decision making under risk. Achievement motivation, which is separated into hope for success and fear of failure, is thought to influence risky decisions, when options unambiguously differ in advantageousness (= in known outcome probability and value, i.e., expected value), so that the outcome is indicative of the decision maker's abilities. In this study, 108 participants (mean age = 22.86 years; 73% female) completed a gambling task in which they choose between a risky and a safe option with known outcome probabilities. Outcome probability and value of the risky option were systematically varied, so that choices were risk-advantageous, risk-

disadvantageous, or had the same expected value compared to the safe option. Consistent with previous findings, participants took more risk if the choice was advantageous than if it was disadvantageous. Hope for success predicted a higher risk preference when the expected value was equal for the safe and risky option (ambiguous situation). As both options did not differ in advantageousness, outcomes are, in contrast to previous findings on achievement motivation, not indicative of the decision maker's abilities. We speculate that individuals with higher hope for success show a higher risk preference under equal expected value conditions because of a higher tendency to explore choice options in ambiguous situations.

The role of interoceptive abilities in the relationship between dissociative symptoms and sense of body ownership

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Dissociative symptoms, such as depersonalization (DP) or derealization (DR), were found to lead to greater body plasticity, as indicated by a stronger rubber hand illusion (RHI). Besides, the RHI was also related to interoceptive abilities in past studies. Therefore, this study aimed to investigate whether dissociative symptoms, in particular depersonalization and derealization, predict the RHI irrespective of interoceptive abilities or whether there is an interaction between both predictors. Accordingly, a questionnaire on dissociative symptoms (FDS), as well as a heartbeat tracking task and the RHI were completed by 112 participants. The DP/DR subscale of the FDS was used for analysis. As indicators for interoceptive abilities the accuracy of the participants' heartbeat counting abilities (Interoceptive Accuracy, IA), the confidence in their abilities (Interoceptive Sensibility, IS) and the meta-cognitive awareness of them (Interoceptive Awareness, IA) were used. The RHI was applied synchronously and asynchronously and was measured using a questionnaire (RHIQ) and a proprioceptive estimation. Results of linear mixed effects analysis indicated that the RHIQ was predicted by synchrony and an interaction of DP/DR symptoms with IA, where subjects with more symptoms had a higher RHI only if they simultaneously had a lower IA. The proprioceptive drift was predicted by synchrony, IS and IA, as well as an interaction of IS with DP/DR, showing that a higher IS was connected to a weaker RHI in participants with fewer symptoms, but to a higher RHI in participants with greater symptoms. We conclude that interoception plays a large role in the connection between dissociative symptoms and the RHI and that different interoceptive modalities need to be distinguished in this relation.

The subjective perception of intelligence from varying pupil sizes

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Our eyes can convey our current mental states based on how we gaze. The pupils can also reflect an individual's cognitive effort despite being regulated by the autonomic nervous

system. We investigated whether varying pupil sizes could influence how we perceive various characteristics of another person. Participants were recruited to complete one of two online experiments. In each experiment, participants saw pairs of colored Caucasian eyes with different pupil sizes (small, medium, big, vergence). We used neutral expression eyes that gazed into the camera. The eyes were never presented twice with different pupil sizes. Pupil sizes were either grossly exaggerated (Experiment 1), or subtly manipulated (Experiment 2). Participants rated each eye-pair on several perceived traits such as attractiveness, intelligence, and realism. Results indicated that the pupils influenced how intelligent the eye-pairs appeared in both experiments. However, the influence of pupil sizes on perceived intelligence was inconsistent across experiments. Our findings hinted that pupil sizes could influence how we perceive another person. However, the mechanism behind pupil size and perceived traits requires further investigation.

The traces of imagination: Early attention bias toward positively imagined stimuli

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Mental imagery can have a powerful impact on emotions and motivation and has the potential to promote adaptive behaviors. Imagining the positive emotional impact of engaging in an activity may increase its positive value and thereby motivate behavioral engagement. Given these properties of mental imagery, it can be expected that positively imagined stimuli become salient and therefore capture visual attention. This study examined the effect of positive imagery on attention using a visual probe task with concurrent eye tracking (https://osf.io/x4wvk). We tested the hypothesis that positive relative to neutral imagery of everyday activities shifts attention toward objects involved in the imagined activity. We recruited 54 adult participants from the general population. They first performed a Positive Imagery Paradigm (PIP) during which they imagined performing activities involving objects presented on a computer screen in either a positive (focusing on the positive emotional impact of the activity) or neutral (focusing on a neutral circumstance of the activity) manner. Subsequently, participants completed a visual probe task using picture stimuli depicting pairs of objects (one per type of imagery) from the PIP. We provide evidence that positive compared to neutral imagery biases the direction, but not the duration, of gaze on objects associated with the imagined activities. This is in line with previous literature on motivated attention suggesting that positive stimuli attract attention rapidly during the early stages of attentional processing. A potential mechanism to explain our findings is evaluative conditioning. By coupling objects with positive emotions through positive imagery, they gain attentional priority due to their increase in positive value.

The within-trial time course of local and global processing in a matching task

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To study the time courses of the global precedence, global-to-local interference, and local-to-global interference effects in a global/local matching task, we analyzed the RT and accuracy distributions using discrete-time event history analysis and conditional accuracy analysis, respectively. In each trial two hierarchical/compound stimuli appeared, one on each side of fixation. For example, a large (global) circle made out of smaller (local) triangles on the left, and a global circle made out of local circles on the right. Participants were asked to indicate whether the shapes were the same or different on the global ("same" in the example) or the local ("different" in the example) level. We also manipulated whether the ignored level would require the same ("match") or opposite response ("no-match"). The global precedence effect (faster response times in the global task) was found to occur in the hazard of response occurrence between 300 and 800ms after stimulus onset. Local-to-global interference was present in same responses between 400 and 700ms. Global-to-local interference was evident by early errors in the no-match conditions, and by a decreased hazard probability of response occurrence between 400 and 800ms. These results suggest that performance depends on the dynamic interplay between three types of shape comparisons or response tendencies: between two local shapes of the same global stimulus (triggering always the "same" response), between two global shapes ("same" or "different"), and between two local shapes on the left and right of fixation ("same" or "different").

Think away your cravings: Comparison of the efficacy of visuospatial and auditory working memory tasks on the reduction of food cravings

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Food Cravings describe a desire for specific foods, which can develop into an urge to consume those foods. The Elaborated-Intrusion Theory of Desire postulates that food cravings arise from a cognitive elaboration with mental imagery. This elaboration requires (visuospatial) working memory capacity and may thus be inhibited with competing working memory tasks. Based on these principles, the present study examines whether there is a difference in efficacy between tasks with visuospatial and auditory load on working memory in reducing food cravings. A total of 206 subjects participated in an online experiment (156 female, 50 male, $M = 25.4$ years, $SD = 9.7$ years). We first evoked food cravings with pictures of palatable foods. Subsequently, participants were randomly assigned to one of two experimental conditions in which they had to perform either a visuospatial (mental rotation) or auditory (mental singing) working memory task. After-

wards, the participants rated their current food cravings on visual analogue scales (VAS) and the Food Craving Questionnaire-State. The results showed that both experimental conditions led to a reduction of food craving through a working memory load (VAS), $F(1, 204) = 52.25$, $p < .001$, $\eta^2 = .05$. However, it could not be confirmed that visuospatial tasks lead to a stronger craving reduction than auditory tasks. This study was able to demonstrate that a brief, modality-independent working memory task in an online format leads to the reduction of current cravings. However, limitations arise from the differing task difficulty of both conditions, artificially evoked food cravings, and the lack of a neutral control group. Still, comparable tasks might serve as simple treatments in intervention settings (e.g., for individuals with eating problems).

To follow or not to follow: Influence of valence and consensus on the sense of agency

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Many daily decisions are influenced by advice we receive from others. Irrespective of whether we follow such hints or not, we sometimes regret not having listened or blame the other for bad guidance. The resulting feelings seem to be dependent on outcome valence and consensus. This raises the question of how consensus and outcome valence influence a person's conceptions of the self as the origin of an action and subsequent events, i.e., a person's sense of agency. To address this question, we conducted two online experiments analyzing influences on explicit and implicit measures of the sense of agency. Participants played a digital thimblerig and received hints towards either of the cups by a fictitious co-actor. Correct decisions were rewarded and incorrect ones punished financially. Both positive action outcomes as well as dissent decisions significantly increased explicit ratings of responsibility and control (Experiment 1). In contrast, temporal binding as an implicit measure for the sense of agency was not affected by consensus and was significantly larger for negative outcomes (Experiment 2). We propose that consensus and outcome valence directly affect retrospective and reflective aspects of the sense of agency, whereas the influence on prospective aspects depends on situational characteristics.

Top-down inhibition of threatening emotions and threatening shapes – is it possible?

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In a visual search task, the behavioural and attentional inhibition of neutral physically salient distractors is possible based on the Signal Suppression Theory. According to previous research, threatening information also acts salient, although there is no consensus about what makes them so. Evolutionary theories say that fearsome affective valence plays a crucial role in the quick attention capture of threatening objects. On the other hand, the General Feature Theory claims that threatening stimuli are salient because of their unique features, such as their shape, movement, or sound. Previous research has

proved that curvilinear shapes and downward pointed 'V' shapes elicit the same response as snakes and angry faces, for example. In the present study, we aimed to test whether threatening information as distraction can be inhibited, and whether the attentional bias towards threats is caused by the affective information or the general feature of shape. Participants completed a semantic vigilance task, where they had to differentiate between 'living' and 'non-living' neutral words presented and masked in the centre of the screen. Alongside the words, four icons were presented in either of three spatial conditions: on the fovea, parafovea or periphery. Three of the four icons were always neutral, while one could be a threatening one (snake), a non-threatening but shape-similar one (caterpillar) or a neutral control (fish). Our findings suggest that threatening information comes both from affective information and general features, but the latter is easier to inhibit.

Using an AR-interface for efficient navigation to DRT pick-up locations: A naturalistic field study

Fabian Hub, Till Meyer-Arlt, Hüseyin Avsar, & Michael Oehl
German Aerospace Center

Shared automated mobility on-demand (SAMOD) is considered as a convenient mobility solution in the future. Once the user books a fare via smartphone, the DRT service algorithms set up a pick-up location spontaneously. The user then walks to the flexible meeting point and waits for the shuttle. Here, the users' main challenge is to navigate and to identify effortlessly the virtual pick-up location, which has no references in the real world. To achieve high user acceptance of new automated mobility services, providing customers with an intuitive information system is essential. Especially, when navigating to flexible pick-up locations users must be provided with high user experience. Our developed human-machine interface (HMI) prototype addresses this challenge by using means of augmented reality (AR). It provides users with information in reference to the street environment. This should ensure users' high rates of pragmatic quality and low rates of cognitive workload when solving the task. A naturalistic real-life exposure study was conducted with 23 young adults. Almost everybody experienced smartphone navigation for pedestrians (e.g., Google Maps) before and more than half of the participants experienced AR before. Participants were asked to navigate to a pick-up location in unfamiliar territory. Participants were guided by the AR-HMI prototype through an urban setting and a building. They had to solve the task within a given time frame. Cognitive workload and UX of the prototype were captured. The VRAP prototype provided positive UX especially in terms of high pragmatic quality to the participants. Furthermore, cognitive workload was low. Results showed the positive perception of AR-navigation. Implications for application and further research will be discussed.

Variance in self-regulated category learning

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People can learn about categories by sampling their members, but determinants of sam-

pling behavior are not yet well understood. In the current project, we investigate how learning about categories changes with the relation of between- to within-category variance. Specifically, we assume that successful categorization hinges on two subprocesses: identification and discrimination. A low within-category variance of the experienced exemplars should support identifying the category, whereas a high between-category variance should facilitate discrimination. To investigate this, we conduct a first experiment, in which we separately manipulate within-category variance for two categories on three levels, low, medium, and high in a dot-pattern prototype distortion task. In the task, participants can learn about the two categories by sampling as many exemplars as they want from each of the categories. After this learning phase, participants are tested on exemplars of all three variance levels as well as the respective category prototypes and have to indicate the likelihood with which an exemplar belongs to either category. We expect that higher category variance leads to longer sampling in the category learning phase. Further, we expect that within-category variance differences and the total variance influence sampling. In regard to categorization decisions, we expect that prototypes are more likely assigned to their respective categories. Participants will perceive test exemplars with a lower variance than the variance of the category they were trained in as more likely belonging to this category than exemplars with equal or higher variance. In sum, using a self-regulated category learning paradigm will provide us with new insights on category learning processes

What is more democratic, a stone or a feather? Predicting nonsensical judgments using high-dimensional vector representations obtained from a semantic space model

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Semantic space models are powerful tools in semantic memory research, which use the distributional structure of words in large natural language datasets to derive high dimensional vector representations for the words or concepts in a semantic space. In a recent line of research, these word vectors have been used to predict judgments of similarity, of probability, or of other quantities. If these spaces capture the structure of human conceptual representations, it should also be possible to predict comparative judgments of concepts on nonsensical attributes as long as the concepts are spatially arranged at sufficiently distinct locations along the attribute dimension. In a first experiment, we presented $n = 30$ participants with $k = 60$ nonsensical comparisons, in order to investigate the ability of the semantic space model to predict the response of participants. Overall, the analysis using a Bayesian logistic hierarchical regression model showed that the model could predict the responses of participants above chance level, with a accordance rate of model predicted and observed responses of $\theta = 57\%$. However, the results also showed that while there were only small difference between participants (θ ranging from 53% to 56%), there were large differences between items in how good the model predicted the actual judgment of participants, with accordance rates ranging from $\theta = 36\%$ to $\theta = 89\%$. Given that the observed responses of participants are similar and as predicted by the semantic space model, at least for some items, might indicate that the derived

high dimensional vector representation of the semantic space to some extent incorporates some shared aspect of people's semantic memory.

What makes a scene? The contribution of global scene information to fast scene categorization

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Scene-centred theories of fast scene categorization propose that the ability to quickly and accurately categorize our environment into meaningful scene categories can be explained by the fast processing of global scene properties. We causally tested this claim by reducing scene images to different sets of global scene properties with varying degrees of local information. In Experiment 1, human observers reached above-chance categorization accuracy for most stimulus conditions, indicating that images reduced to global scene properties indeed allow for correct categorization. In Experiment 2, we demonstrated that these features can be extracted from only 30ms of stimulus presentation. However, accuracy in both experiments was far below performance on unmanipulated images and differed strongly between conditions. Images preserving local information yielded better performance than those with less or no local information. In Experiment 3, we related this performance advantage to the identification of single objects in stimuli containing local information which supports the notion that object information is used for scene categorization. Taken together, we show that global scene properties are useful but not sufficient for fast scene categorization. Instead, local information is crucial in this process, presumably because it conveys object identities.

What would Jesus say? Crisis communication of the Catholic Church in relation to abuse allegations

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She is left with a "frozen soul". Her and countless other victims of the abuse cases that are now slowly coming to light, which took place in Catholic churches. The children were of kindergarten or primary school age and were sexually abused and tortured by priests, bishops and other powerful men in the church. The negative impact of these incidents on the catholic church has been amplified by the at times inadequate cooperation between the Catholic Church and authorities. The present study was carried out to investigate to what extent different crisis communication styles help to maintain parts of the positive image in a scandal of this magnitude. Based on the Situational Crisis Communication Theory (Coombs & Holladay, 1996), the types "denial" and "rebuild" of crisis communication were examined in terms of their effectiveness. Statements were manipulated in different ways and then examined to determine whether the manipulation resulted in a lower or more severe loss of image. The following hypotheses were focused: A full apology with admission of guilt and request for forgiveness of the victims would cause the least image loss of the church (H1). The Catholic Church tends to be rated better by devout Catholics

than by all other groups (H2). If the person communicating regarding the abuse cases is socially respected, the statements tend to be received more positively (H3). Pre-crisis reputation moderates the influence of crisis communication strategy (H4). These were tested using an online experiment that is presently ongoing. Results will be analyzed using a 2 × 2 × 2 ANOVA to test hypothesis H1 to H4. The study is preregistered (https://aspredicted.org/see_one.php).

What's in a scene? Investigating generated scene information at different visual processing stages

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In recent years, deep-learning research has produced a range of neural networks that are able to classify and generate images from a variety of stimulus domains. At the same time, advances in cross-domain analysis methods (e.g., representational similarity analysis, RSA) have allowed us to make inferences about the human visual system based on the representational spaces of these networks. State-of-the-art generative networks provide a useful testbed for probing and manipulating representations at different stages of scene generation which could help us better understand "what makes a scene?". To investigate how well a generative network (PROGGAN) captures real-world scene gist and whether the information content of generated scenes is rich enough to trick human observers we conducted an online experiment. Participants had to detect real from generated images of scenes for varying presentation-times (50 vs. 500ms) and rate the degree of realism for each generated scene. We found that for short presentation times participants performed only slightly above chance, while for longer presentation times sensitivity (d') increased significantly and response bias became more conservative. Interestingly, realism ratings correlated with the false alarm rate of generated images in both conditions. Our results imply that the information contained in generated scenes triggers similar processes in the visual system during a first glimpse, but that generated scene information is perceived as less realistic with time. Based on these explicit and implicit measures of realism, we can use network dissection on the generator at different representational stages to better understand the content and structure of real-world scene representations in the human visual system.

When even the smartest fail to prioritize: Overuse of information can decrease adaptive decision making

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Many decisions require prioritizing relevant over less relevant information. To decide adaptively in risky, non-compensatory environments, probabilities must be used to weight information according to their relevance. We investigated whether participants with high ability (university PhD students, postdocs, and lecturers) and high motivation due to generous performance-dependent payment will be able to use probabilities effectively

for prioritizing relevant over less relevant information in a probabilistic decision task and, therefore, decide adaptively and achieve better outcomes. A variant of the standard probabilistic-inference-paradigm of decision research was used for which interindividual variability has been repeatedly demonstrated. We assessed whether participants' statistical-methodological competence can explain these differences in adaptive decision making. Contrary to the assumption of adaptive decision making, our participants looked up twice the amount of information that was necessary. The findings also show that people have difficulty in consistently prioritizing relevant information – even highly able and motivated participants. In explicit decision contexts, participants achieved high decision accuracy, yielding high monetary gains. However, when information was conflicting, the overuse of information led to mistakes – specifically, to a deviation from adaptive behavior. Statistical-methodological competence and numeracy could not explain the deviation.

Who is privileged anyway? – The influence of expectancy violation and fairness judgments on perceptions of privilege

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Considering the privileges held by individuals is becoming an increasingly prominent topic in social justice discourses. However, systematic analysis of the psychological processes involved in the perception of privilege has yet to be provided. Following research from the area of expectancy violation, I develop a theory that aims to explain how people form privilege judgments. I theorize that two aspects, in particular, are relevant for assessing privilege: (1) the extent to which individuals deviate from the perceived norm concerning a socially relevant characteristic and (2) the causes of existing deviations. I hypothesize that an individual is judged as being privileged, if deviations from the norm are exceptionally big (exceptionality) and if the causes for these differences are judged as unfair. Two studies ($N = 360$) with German online samples were conducted to test this hypothesis. In both studies, participants were given information about the income of a fictitious person, Martin, and asked to assess the extent of his privilege. The findings of Study 1 support the stated hypothesis. The stronger Martin's income deviated from the income one could expect to be earned in Germany and the more participants judged this to be due to unfair reasons the more privileged he was perceived. Study 2 replicates these findings and demonstrates further that, when given limited information, people intentionally seek information that allows them to assess a person's exceptionality and the fairness of existing norm deviations when asked to assess privilege. This research is the first to socio-psychologically theorize and analyze how people form privilege judgments. In doing so, it lays a first foundation for developing an understanding of the processes underlying privilege judgments.

You "beta" watch me talking: The role of beta-oscillations in audiovisual cocktail-party speech perception

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Perceiving speech in a cocktail-party environment requires the listener to successfully segregate and select relevant, and to ignore irrelevant information. Older adults tend to have more difficulties in such situations. However, processing audio-visual instead of auditory-only speech is beneficial and can compensate for age-related decline. During audio-visual perception, beta-band oscillations are likely linked to (error) monitoring processes. Stronger suppression in the beta band has been shown for incongruent stimuli and in multitalker environments. In the present EEG study, we investigated the role of beta band oscillations in younger ($N = 21$, $20-34$ years) and older participants ($N = 18$, $60-70$ years) in a multitalker scenario. On a horizontal array, we presented audio-visual recordings of two speakers simultaneously uttering either a target (yes/no) or a distractor word (1–10). The targets always appeared at a pre-defined, fixated position to the left or right of the listener, who had to discriminate the two target words by button press. The presented information was either valid (AVcong) in both modalities or only valid in the auditory (Aval) or visual (Vval) modality, respectively. Response times indicate, that even though older participants were slower, both groups showed faster responses with AVcong compared to Aval information. There were age differences in beta power, with larger suppression in older participants. Furthermore, larger beta suppression was observed in Vval compared to AVcong. Although we observed age-related differences, we did not find clear evidence for a benefit of congruent audio-visual information in either group. However, the stronger suppression with Vval information is in line with a connection to error monitoring.

No-data posters

A strategic view on the relationship between cognitive flexibility and multitasking behavior in flight missions

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Flight missions are highly complex and dynamically changing scenarios in which different tasks have to be executed in close temporal proximity. Hereby, superior executive functions are essential to successfully complete a flight mission. The following project aims at investigating the strategic use of cognitive flexibility, as part of executive functions, in a combat flight simulator. The chosen approach is inspired by the Metacontrol State Model (Hommel, 2015), describing that goal-directed behavior emerges from a balance between flexibility and persistence. It is hypothesized that serial task performance, related to the concept of persistence, aims at supporting focused decision-making by avoiding distraction from irrelevant task demands. Contrary, parallel task performance, relating to the concept of flexibility, is predicted to enhance time efficiency and reactivity to unpredictable changes as well as task-switching. However, it is yet unknown how these concepts relate to strategies and the performance level in a flight mission. A mixed method approach is expected to maximize the data output from a relatively small sample size. Quantitative analysis of eyetracking data will be used to reveal the underlying attentional processes and identify instances of task-switching. Behavioral data intends to unfold the actual task performance and individual performance styles. Finally, semi-structured interviews will gain in depth insights into the underlying decision-making processes and mental models of the subjects. Investigating the relationship between cognitive flexibility and multitasking behavior in the actual application of a flight mission is important for further development of adaptive cognitive assistance systems.

Are smartphones making us lazy? An experimental study on the effects of smartphone use on procrastination

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Smartphones are considered among the most widespread and popular communication devices. In this context, it can be seen that the smartphone medium has shaped and changed the existing communication and information landscape enormously. In addition, the smartphone also has an impact on an individual's workflow, as it provides constant distraction, interruption through notifications, calls, etc., and provides amusing entertainment. These distractions can lead to procrastination. That is, putting off tasks that the individual intends to do, despite negative consequences or risks (Steel, 2007). This can go so far as to result in problematic smartphone use that exhibits addiction-like tendencies, as the symptoms resemble those of addicted patients, such as loss of control, mood regulation, or loss of cognitive functioning. It is hypothesized that smartphone use has an impact on procrastination and that individuals who tend to have problematic smartphone use procrastinate more. For this purpose, a quasi-experiment with two

measurement time points is conducted on students. First, a questionnaire consisting of the MPPUS (Mobile Phone Problematic USe Scale), the GPS (general procrastination scale) and the current screen time is to be completed and then the smartphone screen of the subjects is to be transferred to black and white mode with their consent. If possible, the smartphone screen should remain in this mode until the next examination time.At the second measurement time point (1 to 2 weeks later), a questionnaire consisting of the MPPUS, the GPS and the current screen time is filled out again and, in addition, questions are asked about the changes in usage behavior during the experiment.

Comparison of methods regarding neurophysiological and advanced behavioral analysis for a divergent thinking task

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Creativity is a multi-staged cognitive process that is traditionally studied using divergent thinking tasks. One of the most widely used tasks to measure divergent thinking is the Alternate Uses task (AUT), that requires participants to think of unusual uses for daily objects, such as shoe or newspaper. One behavioral measurement of the AUT is fluency, which describes the number and the speed of participants to give (verbal) responses for the uses of each object. We aim to directly compare this behavioral measurement of the AUT by contrasting traditional reaction time (RT) analysis with discrete event-history analysis. The idea is to study the temporal course of behavior in more detail. Furthermore, over the last years, cognitive neuroscientists started investigating the neuronal activity of the divergent thinking process by using electroencephalography (EEG). To investigate the time course of EEG activity, many researchers use Fast Fourier Transform-based approaches. These approaches provide insight into the frequency domain but do not provide information about temporal changes. In contrast, time-frequency approaches provide frequency-specific and temporal information. In our view, they are therefore well suited to investigate time-related changes during divergent thinking. In our study, we aim to provide a direct comparison by using both approaches on the same dataset. With that, we hope to show the methodological advantages of each approach in order to improve future researchers' choice on the appropriate method (EEG and RT data) for divergent thinking tasks.

Does visual saliency affect sound localization?

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Visual dominance over auditory localization is a well-documented phenomenon, for example, in the ventriloquist effect – the illusion that sound is coming from the moving mouth of a puppet instead of the actual speaker. Typically, this effect is studied in laboratory experiments by simultaneously presenting auditory and visual stimuli but with spatial discrepancies between them. Generally, the audio-visual spatial conflict is resolved favouring vision. Additionally, in vision, stimulus saliency affects eye movements, attention allo-

cations, and even later processing stages, such as visual working memory (Constant & Liesefeld, 2021; https://doi.org/gjk9jh). Taken together, it seems plausible that visual saliency biases sound localization. In a first step to test this novel hypothesis, we plan to investigate the effect of relative visual saliency on sound-source localization when the visual saliency of audio-visual objects is of relevance. A display is used inside a virtual reality setup consisting of vertical grey bars arranged in three semi-circular rings. Every alternate bar in the second ring is tilted 12° to the left, making them salient compared to the remaining vertical bars. In half of the trials, one of these bars is tilted 45º to the left – thus rendering it relatively more salient amongst the tilted bars. An auditory stimulus is presented at the beginning of each trial from the location of one of the tilted bars, and the task is to select the bar which is perceived as the sound source. We hypothesize that if visual saliency affects sound localization, there will be a significant selection bias towards the 45º tilted bar.

Emotional contagion in dyadic online video conferences – a new methodological approach

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Due to the COVID-19 pandemic, many aspects of people's lives worldwide have been moved to digitally supported environments, e.g. learning activities or everyday social interactions. While these alternatives have proven to be more or less useful on a technical level, their impact on individuals' emotional and interpersonal experiences remains unclear. As one important and prevalent emotional process in social interaction, Emotional Contagion (EC) comprises the mostly automatic and unconscious transmission of emotions between individuals. In previous research, EC has been studied in various interactive contexts, e.g. teachers and students or leaders and employees, and it has been found to be linked to important outcomes, e.g. cooperativeness or emotional understanding. To examine EC in dyadic online video conferences, we developed a new methodological approach involving two individuals interacting with each other via synchronized computers. Within this approach, the participants are each being filmed by a webcam in combination with a Lavalier microphone for better audio quality. Participants' heart rate and galvanic skin response are measured using BIOPAC sensor systems (www.biopac.com), their facial expressions are analyzed using the facial expression analysis engine Affectiva (www.affectiva.com), and they retrospectively report on their subjective experience of joy, anger and sadness. All data is collected and integrated within the iMotions software package installed on both computers (www.imotions.com). According to the results of a first pilot study ($N = 18$), our approach seems to be highly feasible and a promising foundation for future research on emotional experiences in different socially interactive situations online, e.g. psychotherapy or counseling services.

Focal tDCS to enhance word learning from context: Impact of timing, stimulation location and (outcome) predictors

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Transcranial direct current stimulation (tDCS) has previously been shown to enhance vocabulary learning. However, this evidence comes from associative learning paradigms, that mimic rote learning of new vocabularies. Moreover, little is known about the regional specificity and optimal timing of tDCS or the mechanisms underlying inter-individual variability of the stimulation response. In the present study, we are investigating tDCS effects during contextual word learning, which closely resembles natural word learning in childhood and also later in life. In a placebo-tDCS controlled, between-subjects design, focal tDCS is administered either (a) to the left middle temporal or inferior frontal cortex (MTC/IFC), and (b) during acquisition or retrieval of the novel vocabulary. Because MTC and IFC are specifically involved in meaning integration or retrieval, this design allows investigating both regional and temporal specificity of tDCS effects. We also aim to scrutinize potential predictors of the stimulation response. To this end, structural magnetic resonance imaging data is acquired prior to the experimental phase, to quantify the variability of current flow to the target region(s) across participants. Diffusion-weighted imaging and resting-state functional MRI serve to investigate the impact of baseline structural and functional brain properties on stimulation outcome. Besides the investigation of regional and temporal specificity of the tDCS effects, this study will help to elucidate the role of MTC and IFC during contextual language learning.

Influence of infant-directed speech on attention and visual processing in 4-month-old infants as measured by erp and gamma activity

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Evidence suggests that infant attention for and learning of speech stimuli is enhanced by infant-directed speech (IDS), characterized by a higher mean pitch and higher variability in prosody. Much less is known regarding a potential general effect of IDS on cognitive processes, such as attention and learning during the encoding and processing of visual or multimodal information. We plan to test 22 4-month-old infants in an EEG cueing paradigm to investigate the effect of IDS compared to adult-directed speech (ADS) on attention for visual stimuli. During the cueing phase, we will present visual objects (60 different exemplars, e.g., car, house, spoon…) for 1,500ms, accompanied by the prompt "Look here" ("Guck mal") spoken by 50 different speakers. The speech register (ID/AD) will vary across trials. The same object will be presented again for a 1,000ms test phase. During the cueing phase, we will measure frontal gamma activity indicative of attentional focus. We predict decreased gamma activity over frontal regions while listening to ID rather than AD speech. The Nc ERP component, associated with attention to visual

stimuli, will serve as measure of attention during the test phase. We expect increased Nc amplitudes for stimuli cued by ADS, suggesting less comprehensive processing during the cueing phase. This investigation will provide evidence on early cognitive effects of speech registers, paving the way to a deeper understanding of early multimodal learning via attention. We are looking forward to receiving feedback and discuss the stimulation of ERP and oscillations analysis.

Investigating pupil-linked arousal to complex and statistically uncertain auditory patterns

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Humans track regularities in the environment and thereby adapt their behavior to changes. Changes offer risk and/or opportunity, therefore mandating arousal, and require internal models of environmental regularities to be either updated or completely reset and replaced with newly learnt alternatives. The locus coeruleus and the norepinephrine system (LC-NE) are thought to regulate such arousal and model updating and replacement in the brain. LC-NE's effects on pupil dilation responses (PDRs) lead to the latter's use as biomarkers for arousal and model change. We will measure PDRs to investigate the relationship between uncertainty of auditory patterns, arousal and model change. Generalizing Zhao et al. (2019, Nature Communications), we will generate auditory patterns consisting of pairs of (a) random auditory sequences, (b) regular sequences composed of the same tones, (c) constant tones, and (d) white noise. This allows various environmental changes to be realized (e.g., a switch from a regular pattern to a random pattern for abrupt change, or a switch from a random pattern to a regular pattern for gradual change) so the role of LC-NE in model change can be studied. We will also manipulate the complexity of the auditory patterns by varying the number of tones per sequence to reveal the relationship between pupil-linked arousal and model complexity. So as to tap automatic processes, participants will not be instructed to pay attention to the regularity of the auditory patterns (instead they will be asked to detect a possible gap in the patterns).

Modality compatibility in task-switching: Influence of aging and task preparation

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The stimulus-response modality mapping (MM) plays a crucial role in task switching, with a decrease of performance when switching between incompatible MM (visual-vocal and auditory-manual) compared to switching between compatible MM (visual-manual and auditory-vocal). A recent study demonstrated that this "modality compatibility effect" decreases with a prolonged cue stimulus interval (CSI), thus with longer task preparation. So far, all studies that were conducted tested young participants. However, we know that ageing leads to general and specific cognitive impairments. For example, older adults

have more difficulties with the processing of certain stimulus modalities and get less benefit from a longer task preparation. To our knowledge, no study has investigated the modulation of the modality compatibility effect by preparation in an old population. We aim to address this issue. In our experiment, we use central unimodal cues and lateralized bimodal stimuli combined with manual or vocal responses. Cue modality indicates the relevant stimulus modality, and the CSI will vary randomly. Modality compatibility will vary within subjects with condition order counterbalanced (i.e., participants will either first switch between compatible MM, or between incompatible MM). Regarding younger adults, we expect to replicate previous findings. For the older adults, we expect an overall larger modality compatibility effect. In addition, due to a weaker preparation benefit regarding the effectiveness of preparation, this performance difference between age groups should be even more increased with longer CSI. This data pattern would confirm the increased challenge older adults face when dealing with incompatible MM and high task-set competition, i.e., high working memory load.

Modulation of imagery rescripting and extinction using transcranial direct current stimulation

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Extinction training and imagery-rescripting reduce threat-based conditioned fear responses through contingency-based expectancy evaluation and re-evaluation of the cognitive representation of the unconditioned stimulus. The effects of these interventions may be modulated by Transcranial direct current stimulation (tDCS), which targets cortical excitability and impacts fear learning. This study investigates the effects of tDCS on imagery rescripting and extinction of generalized fear responses to establish a drug-free paradigm for reducing fear responses. In the fear generalization paradigm, ten rings of gradually increasing size will be considered, with the largest and the smallest rings as the CS+ and CS- and the intermediate rings as generalization stimuli (GS). An aversive picture will be used as an unconditioned stimulus (UCS). The participants will be recruited after G*Power analysis and will be randomly assigned into three groups, immediate-extinction, imagery-rescripting, and extinction, and delayed extinction (conducted 24 hours after acquisition), and will be further divided into three groups: cathodal, anodal, or sham and 1.5mA tDCS at the left dorsolateral prefrontal cortex will be applied during the generalization or acquisition phase for 12 minutes. After 24-hours, return-of-fear will be tested through a generalization test. Standardized questionnaires, self-report rating scales, and physiological measures will be implemented to measure fear learning and extinction. We expect that tDCS may modulate the efficacy of the imagery rescripting and extinction processes and impact the generalization of threat-based fear responses.

Multimethod assessment of external and internal processes in children with sad in a social stress situation

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Social anxiety disorder (SAD) is one of the most common mental disorders in childhood and adolescence. Core symptoms entail an intense fear of social situations, fear of negative evaluation by others and avoidance of social situations. Empirical models of the maintenance of SAD emphasize internal (cognitive and attentional) processes and external (situational) factors in social interactions. Aim of our study is to examine internal and external factors which influence SAD in children and their interaction using a multimethod setting. Children between 9 and 14 years with a diagnosis of SAD ($n = 46$) and a healthy comparison group (HC; $n = 46$) will perform two social stress tasks (speech tasks), each in one lab session. Questionnaires during and after the lab sessions indicate cognitive processes; measurements of gaze behavior indicate attentional processes; and measurements of electrodermal and cardiovascular activity during both sessions provide objective data. Session 1 additionally includes a reaction time paradigm to examine internal vs. external locus of attention: participants respond to external visual stimuli and internal tactile stimuli which are used to represent internal body sensations. Compared to the first session, which serves as a baseline, session 2 includes a brief intervention (external: social support vs. internal: self-efficacy instruction) in anticipation of the social stress task. This allows to investigate the influence of potential external and internal buffer effects. The project aims to gain a better understanding of cognitive and attentional foundations in children with SAD and could help to improve therapeutic interventions.

On the challenges of haptic shape perception: The role of attentional and motor control

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Haptic perception of object shape is a complex process that relies on bimanual exploratory movements (e.g., enclosure of hands around a whole object, tracing of vertices and edges). This exploration requires the coordination of both left and right hands. Although there is consensus on the pivotal role of active manual exploration for haptic shape perception, the potential attentional strains on this process are not yet understood. No studies before have evaluated the direct link between attentional control and haptic shape sensitivity. Our project aims to establish this link in typically developing young adults. We hypothesize that participants who are challenged by an increased attentional load will have reduced manual dexterity, and therefore reduced sensitivity to haptic shape. Manual exploration behavior will be affected by attentional load, (e.g., expected slowing, less exploratory actions and more repetitive explorations). Participants will perform a haptic shape discrimination task used in previous investigations (Norman et al., 2020) to obtain their measure of perceptual sensitivity (d'). On some blocks of trials, participants will

also experience cognitive load during the discrimination task. At the beginning of these blocks, the participant will be given a number to memorize, and then will be required to recall that number at the end of the shape discrimination judgment. Over trials, the set size of numbers will adjust (i.e., increase or decrease) to obtain the participant's maximum cognitive load. In addition, we will assess individual executive function capacities and manual dexterity in order to evaluate functional modulators of the hypothesized link between haptic sensitivity and cognitive load.

Quantifying the contribution of top-down information in visual perception using metacognition

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Repetition priming studies have investigated how a briefly presented stimulus (prime) facilitates visual processing of a subsequent stimulus (target). So far, indirect behavioral or electrophysiological measures have been of primary interest to reveal how the prime stimulus initiates visual processing. Here, we focus on participants' direct discrimination performance to quantify how visual processing unfolds over time. In each trial, we present a masked prime stimulus from one of two categories either once (single condition) or twice at different locations varying the SOA between these two displays (repeated condition). In each trial, participants discriminate the category of the displayed stimulus and report a confidence rating of their subjective probability to make a correct discrimination. We then apply a new methodology to investigate how the first stimulus facilitates processing of the second stimulus: In the single condition, we apply Information Theory to quantify the processed information (in bit) about the single stimulus (the average accuracy is insufficient for theoretical reasons). We then measure the information from the repeated condition and apply a Bayesian model to decompose information provided by the second, repeated stimulus. From repetition priming results (Holcomb & Grainger, 2007, *Brain Research*), we expect the second stimulus to contribute more information than the first stimulus because local (for short SOAs; 200ms) and global top-down processes (for long SOAs; 500ms) facilitate processing of the second stimulus. In summary, we contribute to the existing literature on repetition priming with a new methodology that uses metacognition to quantify the contribution of local vs. global feedback mechanisms over the course of visual perception.

Semantic paired-association to odors and memory interferences

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Odors are often considered to be powerful cues of memory. However, early olfactory paired-associates studies showed that odors are not particularly effective associative cues, or only for the first associated target. This led to the belief that proactive interference is particularly strong in odor-associative memory. Further, memory research with other modalities pointed out that semantic similarity between stimuli in a paired-associate

caused retroactive interference. Thus, in the current project, we explore the efficiency of odors as cues in a paired-associates paradigm in comparison to stimuli from other modalities when they are semantically congruent vs incongruent with the target. To do that we conduct two within-subjects studies in which participants learn different pairs of associations (audio-visual, verbal-visual, or olfactory-visual in experiment 1, and audio-verbal, visual-verbal, and olfactory-verbal in experiment 2). In the testing phase, they should recognize the second part of the pairs as a target (visual in Exp. 1 or verbal in Exp. 2) while being presented with the first part of the pairs as a cue (audio or verbal or olfactory). We predict that semantically congruent cues are more efficient than semantically incongruent cues, across all modalities. We also explore proactive and retroactive interference by presenting the cue with different targets across two sessions. In opposition to previous findings, we hypothesize that the strength of proactive (or retroactive) interference will not differ as a function of modality if the cues are semantically congruent with the targets. For semantically incongruent cue-target pairs, we expect to replicate previous findings of stronger proactive interference for olfactory than other cues.

Spatial representation of pitch and loudness indicated by the SMARC effect

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When participants react to tones with varying pitch, responses to high tones are faster when executed in the upper response side in comparison with responses executed in the lower response side and vice versa for low tones, the so-called SMARC effect (Spatial-Musical Association of Response Codes, Rusconi et al., 2006). A comparable effect can be found for the dimension loudness: Responses to loud tones are faster when executed in the upper side and responses to gentle tones are faster when executed in the lower side (Bruzzi et al., 2017). While the effect for loudness can be interpreted in terms of a generalized magnitude representation system with spatially represented magnitudes (e.g., A Theory of Magnitude, Walsh, 2003), this explanation does not hold for pitch due to its classification as qualitative dimension (Stevens, 1957). Therefore, the SMARC effect for pitch and loudness should occur independently of each other. To test this assumption, this study will investigate the simultaneous occurrence of the SMARC effect for pitch and loudness. In general, participants will hear one tone in each trial and either do a pitch discrimination task or a loudness discrimination task. In both tasks, the tones will vary independently in their pitch and loudness level resulting in tones with the same spatial association in both dimensions (e.g., a high, loud tone) or different spatial associations (e.g., a high, gentle tone). Response keys will be aligned along the vertical axis and mapping will be varied within participants, so that for each pitch-loudness combination an upper and lower side response will be collected. The poster will present the detailed experimental design with a focus on the conceptualization of the auditory material as well as the planned statistical analysis.

Stereotypes and the illusion of truth – deconstructing harmful mental schemes

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Stereotypes are generalized beliefs about a group that don't necessarily apply to every individual within the group and which are very resistant to change. In this project, we aim to explore how stereotypes can be deconstructed by testing the impact that repetition and contradiction may have in integrating counter-stereotypical information in people's mental schemes. There is a large body of evidence showing that people tend to believe repeated information more than information they receive for the first time – the illusion of truth effect. Furthermore, people reject information that contradicts previous information – an illusion of falseness effect. Using the illusion of truth paradigm, participants will judge for truth statements that reinforce or deny racial stereotypes. In some of these studies, statements will be thematically related to race (e.g., "Most people arrested due to drug possession are black vs. white"), and in other studies statements will address intrapersonal characteristics (e.g., "Person X is a short-tempered person", being X black vs. white). The statements may present stereotypical vs. counter-stereotypical information about the racial group that is being addressed, and they may be repetitions or contradictions of information presented before, or completely new. We want to test whether repeating counter-stereotypical information can lead to its acceptance as true and whether contradictions of counter-stereotypical information are judged false, as a way of changing race stereotypes. Additionally, in another set of studies, we want to explore whether race stereotypes associated with the sources presenting stereotypical and counter-stereotypical information moderate the effects of repetition and contradiction on truth judgments.

Targeting hippocampus-dependent memory in older adults with tACS-induced theta synchronization

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Developing interventions to retain memory functions in older age is essential in view of increasing older populations worldwide. As age-associated memory decline has been associated with brain network dysfunctions, transcranial alternating current stimulation (tACS) applied to two network hubs (dual-site tACS) provides a promising tool to improve memory in older adults by reinstating long-range connections. So far, this approach has not been investigated in hippocampus-dependent memory. In frontal and parietal cortical regions of the hippocampal memory network, synchronicity of phases in the theta band has been associated with memory performance, and this synchronicity is disturbed in older adults. Therefore, we will target the hippocampal memory network with fronto-parietal

dual-site theta-tACS in healthy older adults ($60 - 80$ years; $N = 54$) and investigate its effect on memory performance. A pilot study in 32 older adults determined (1) left frontal and parietal stimulation targets of the hippocampal memory network using resting-state functional magnetic resonance imaging, (2) electrode setup using electric field modelling, and (3) 6 Hz as the stimulation frequency, based on the EEG data. Stimulation will be applied either synchronously (0° phase shift) or desynchronously (180° phase shift) during a sequence memory task, and compared to sham stimulation in a crossover design. We will record resting-state EEG pre- and post-stimulation. This study will advance knowledge on tACS as a possible intervention against age-related decline of hippocampus-dependent memory and its behavioural and electrophysiological effects and mechanisms.

The connection of force and number magnitude is measured in the hand

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Recent research has suggested that number processing is embodied, that is, it involves the motor system. To test this assumption, we will employ a novel method of grip force measurement. Our predictions are based on two theoretical models: A Theory of Magnitude (ATOM) and the confidence model. ATOM postulates that magnitudes in various domains develop together and are linked to each other. According to this theory, larger magnitudes in one domain should correlate with larger magnitudes in the other domain. Therefore, larger numbers would evoke stronger force responses. In its turn, the confidence model predicts that the amount of evidence in favour of the given response correlates with the response magnitude. Here, high frequency numbers (small and round numbers) will evoke stronger force responses. In our experiment we will record continuous grip force production in high temporal and force resolution (ms/mN) across two tasks employing the Go/NoGo paradigm. In the first task (n-back-1) a stream of white (No-Go trials) and red (Go-trials, 16.7%) single digit numbers will be presented. Participants will have to verbally respond whether a red number is different by 1 or 2 compared to the previous number. In the second task (Single Digit Number), we will present correct (No-Go trials) and incorrect (Go-trials, 25.7%) addition/subtraction problems by their sequential elements (e.g., $1 + 1 = 2$ vs. $1 + 1 = 3$). Participants will have to verbally respond when they see an incorrect answer. In this task, we will be able to measure force profiles of numbers in their relation to their position relative to the operand. Our findings will inform the theory of embodied cognition in general and, in particular, add to our understanding of number processing.

The effect of music on memory reconsolidation window to regulate fear memory

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Memories associated with adverse events have an everlasting negative imprint on a per-

son's mind. It can even result in severe psychological disorders like PTSD, panic attacks, depression, and phobias. Researchers suggest that maladaptive fear memories can be modulated using the reactivation-extinction technique. The benefit of using this technique is that it is a drug-free paradigm and updates the original memory traces; therefore, unlike extinction training, the chance of memory relapse is comparatively low. However, music engages people in a perceived safe and enjoyable context. It offers a means for traumatized people to relate to their healthy identity; therefore, this research tries to understand the effect of music intervention on the reactivation-extinction paradigm. The experiment comprises a 3-day fear learning paradigm. On Day 1, fear is acquired using geometrical figures as conditioned stimuli and an aversive sound as an unconditioned stimulus. On Day 2 (20-26 hrs later), the participants were assigned to three separate groups. In the first group, acquired fear memory will be reactivated using a single cue; 10 minutes after reactivation, a 6-minute music intervention will follow. The second group will receive no music intervention after reactivation. Both groups will undergo extinction training. In the control group, extinction training will occur without reactivation. On Day 3 (20-26 h later), all the three groups will undergo extinction training after reinstatement with 4 UCSs. The fear responses will be measured using expectancy ratings, standardized questionnaires, and physiological measures. We expect that reactivation followed by music intervention and extinction would rewrite the original fear memories and reduce the conditioned fear responses, compared to the reactivation-extinction and extinction-only groups. This study highlights the use of reconsolidation as an updated mechanism to alter fear-related emotional memory through music intervention.

The impact of semantic-syntactic features on language switching

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We will examine the influence of semantic-syntactic features using classifier in a language-switching paradigm. Classifier (e.g., a group of, a bar of….) can activate nouns that are congruent in terms of semantic (i.e., a group of students vs. a group of soap) and syntactic features (i.e., a group of students vs. a group of student). Participants will name a picture in one of two languages (Chinese vs. English). Before the presentation of the picture, they will see a written classifier surrounded by the cue (red or blue frame indicating in which language to name the picture). We will first focus on the syntactic features (plural vs. singular of the nouns) in monolingual participants. In further experiments, we will introduce language switching either between trials (i.e. picture naming will switch between Chinese and English but classifier and picture naming are in the same language) and/or within trials (i.e. the written classifier is in a different language than the picture naming). We expect to observe a main effects of congruency (better performance in congruent than in incongruent classifier-noun combinations) and of between-trial language switching (worse performance in switch than in repetition trials). We further predict that a classifier can prime (i.e., activate) congruent nouns. This priming could help to overcome language inhibition in language-switch trials so that language-switch costs should be reduced in congruent classifier-noun combinations. This priming benefit, however,

might be stronger for with-trial language repetitions than switches, indicating a stronger priming of semantic-syntactic features within than between languages. Taken together, we aim at contributing to a better understanding a grammatical features in language switching.

The influence of emotion on affective memory encoding

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Emotion is a complex interplay of subjectivity, physiological response, and behavioural expression which is critical to everyday cognition and life. Research has supported the facilitative role of emotion in the encoding and retrieval processes that can enhance or impair the recall of memory. The quality of affective experience deeply influences the memory encoding process of transforming information into neural codes. However, the effects of emotion on individual differences have been underexplored. It is observed that people with higher anxiety traits are prone to generalise fear by reactivating the fear episode. This could be due to increased sensitivity towards fear-relevant versus fear-irrelevant stimuli. We will examine the effect of emotional arousal on memory. The effect of stimulus nature that is fear-relevant or -irrelevant (neutral), level of anxiety trait (high/low) and gender (male/female) on memory encoding. The multivariate analysis would be performed using data from subjective scales, behavioural measures, and physiological responses. We will use the episodic memory encoding paradigm where the subject would be presented with an encoding task and retrieval task. Physiological and subjective measures will be recorded from all participants throughout the experiment. We expect to find a significant effect of emotion-provoking stimuli on memory encoding from the study, which should be higher for fear-relevant stimuli. Registration of physiological changes in the body when facing emotional stimuli would be prominent in people with higher trait anxiety.

The influence of relaxation on cognitive control

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Cognitive control is the ability to act based on current goals and suppress actions triggered by the environment or habits. Here, we ask how the global state of arousal influences cognitive control. To address this question, we manipulate arousal using a progressive muscle relaxation (PMR) exercise and assess its effects on cognitive control. Cognitive control is measured with a variant of the Stroop task, the spatial Stroop. Furthermore, to measure the participants' subjective feeling of relaxation, a relaxation questionnaire (RSQ) is used. Participants perform a total of 4 sessions (and 1 training session). In 2 of the sessions, they perform a PMR exercise, in the other 2, a waiting control condition. Before and after the exercise/control condition, participants fill out the RSQ and perform the spatial Stroop task. The effects of PMR are assessed by comparing cognitive control between the PMR and control condition (corrected for performance before the

exercise/control condition). If the modulation of cognitive control by a simple relaxation exercise (i.e., PMR) is possible, it could allow people to actively adjust their own cognitive control and thus improve in various domains such as decision making, problem solving, or driving.

Unifying an evidence accumulation model and the N-cue heuristic in a trust-distrust experiment

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Decision strategies related to the N-Cue heuristic define a spectrum between 1-Cue reasoning such as Take-The-Best (TTB) and all-Cue reasoning such as Weighted ADDitive (WADD). This study will investigate to which extent an Evidence Accumulation Model (EAM) can unify these strategies. We will use the framework of selective influence tasks to validate the so-called boundary-threshold parameter "a" of the Drift-Diffusion-Model (DDM) adaption. Here, we will selectively influence the information used in a decision. We will manipulate participants' ($N = 60$) perceived trust and distrust in an online between-subject designed experiment. Subjects will make 160 decisions with two options each. Participants have six binary attributes (expert recommendations) that differ in validity. The expert recommendations are provided with pictures of faces that look trustworthy or untrustworthy, depending on the condition (trust/distrust). When the perceived distrust is high, we expect participants to accumulate more information (higher boundary threshold) and rely more on compensatory strategies such as WADD. When the perceived trust is high in contrast, people tend to rely on less information (lower boundary threshold values) and on non-compensatory strategies such as TTB. This study is part of a research project to combine Adaptive Toolbox (AT) strategies with EAM. The Toolbox's well-formulated reasoning process of processing and sampling information is lacking in the EAM description, which is more general. However, EAM, in contrast to AT, precisely describe response times and responses. The greater goal is to combine both theories strengths by investigating to which extent these frameworks can be unified.

Zusammenhänge zwischen User Experience und Angebotsakzeptanz

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Das Ziel des Forschungsvorhabens besteht darin, die Zusammenhänge zwischen User Experience (UX) und Angebotsakzeptanz holistisch zu untersuchen. Die UX und deren Bestandteile sollen dabei möglichst ganzheitlich und die Angebotsakzeptanz sowohl hinsichtlich Einstellungs- als auch Verhaltensakzeptanz betrachtet werden. Unter dem UX-Begriff werden in der Praxis sowie Wissenschaft neue Ansätze geschaffen, um interaktive Produkte aus einer erlebnisbezogenen Perspektive zu betrachten, anstelle alleinig funktionelle Produktqualitäten zu berücksichtigen. Investitionen von Unternehmen in positive UX unterliegt die Annahme, dass eine Verbesserung derselben eine gesteigerte Angebot-

sakzeptanz und damit ein gewünschtes Verhalten (z. B. gesteigerte Nutzungshäufigkeit/-intention oder Kauf) mit sich bringt. Modelle der UX-Forschung (z. B. Hassenzahl, 2001; Thüring & Mahlke, 2007) stützen die Auffassung, dass sich die UX positiv auf das Verhalten der Nutzenden auswirkt. Der Fokus empirischer Untersuchungen lag bislang zumeist auf der Untersuchung einzelner UX-Bestandteile sowie auf Zusammenhängen zwischen UX und einstellungsbezogener Akzeptanz. Auf Basis bestehender Modelle der UX- und Akzeptanzforschung wird aktuell ein Forschungsmodell erarbeitet, das die Zusammenhänge zwischen UX und einstellungs- sowie verhaltensbezogener Akzeptanz hypothetisch abbildet. Diese Zusammenhänge sollen in einer Metaanalyse überprüft werden. Die Ergebnisse der Metaanalyse werden den Ausgangspunkt für die weitere Hypothesenbildung darstellen, um diese in späteren experimentellen Versuchen, u. a. im Kontext automatisierten Fahrens, zu überprüfen. Im Beitrag werden das erarbeitete Forschungsmodell, ggf. erste Ergebnisse der Metaanalyse und die geplante Methodik zur Untersuchung der Zusammenhänge vorgestellt.

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